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ABSTRACT

This three-phase literature review focusses on the dangers of drug misuse or abuse by the elderly, and seeks to assist in the development of prevention and treatment strategies. The first phase focusses on the aging process and psychoactive drug use in clinical treatment. The second phase identifies and synthesizes information on the patterns of psychoactive drug use by the elderly. The final phase identifies operating programs established to prevent and/or treat the problems created by drug misuse or abuse by the elderly. Each section includes a reference list targeted to its focus. (Author/BMW)

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The Aging Process and Psychoactive Drug Use

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
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Alcohol, Drug Abuse, and Mental Health Administration

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FOREWORD

NIDA is concerned about the dangers of drug misuse or abuse by the elderly and is interested in assisting in the development of prevention and treatment strategies. In 1975, as a result of a NIDA-sponsored conference on Drug Use by the Elderly, it became evident that no systematic attempt to organize, analyze, or evaluate the available data on the drug use problems of the elderly had been undertaken. To gain a clear understanding of the drug-related problems of the elderly, the Services Research Branch initiated, with the Stanford Research Institute (SRI), a three-part study of the available literature.

The objective of the first phase of this study was to examine the literature on the physiological and psychological changes attendent to the aging process and the relationship of these changes to drug use. This section should prove to be of greatest value to those dealing directly with the care of older persons.

The second phase of the study was designed to identify and synthesize information on the patterns of use of psychoactive drugs by the elderly. This section reflects the difficulties of dealing with this topic because of the discontinuous nature of the studies available and because of the need for systematic research in this area. From the data that are available, it is difficult to conclude that there is a substantial problem of drug misuse or abuse by the elderly. And yet, the available data do indicate that the elderly are a major group in the consumption of prescription and over-the-counter drugs, and that particular characteristics of the elderly--increased incidence of diseases, polypharmacy, etc.--make them prone to drug misuse/abuse situations. Thus, the findings on use of psychoactive drugs by the elderly warrant a closer examination of the appropriateness of that use.

The third phase of the study sought to identify operating programs which have been established to prevent and/or treat the problem of drug misuse or abuse by the elderly. As might be expected, it was revealed that there are few active programs in the area of specific intervention and treatment of the elderly psychoactive drug user.

This monograph is composed of three separate reports, each presenting the findings of the three phases of the study. Each report can be read as a separate document. In addition, two sets of appendices are included, as well as an annotated bibliography. Appendix A contains a list of researchers working in the subject area, and appendix B presents a list of programs designed to intervene in psychoactive drug misuse/abuse by the elderly.

We hope that this monograph will serve as a helpful guide to interested clinicians, researchers, or relevant governmental and community-based agencies who are responsible for providing assistance to elderly individuals who may be experiencing problems related to drug use.

Michele M. Basen
Services Research Branch
Division of Resource Development

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THE AGING PROCESS AND PSYCHOACTIVE DRUG USE IN CLINICAL TREATMENT

Barrie Piland

INTRODUCTION

With the growing size of the elderly population, and the enactment of Medicare legislation in 1965, increasing attention has been paid to health care among the elderly. The relatively slow development of geriatric medicine as a specialization, however, underscores the need to closely examine the unique physiological changes associated with old age in order to provide the best and most appropriate medical care possible. In no instance is that more true than in the case of psychiatric care, especially when psychoactive drugs are used as a form of treatment. The potential for inappropriate use of psychoactive drugs among elderly patients rests on two primary bases: 1) diagnoses of psychiatric symptoms that fail to take into account the unique physiological, psychological, and sociological characteristics of the older person may lead to improper use of psychoactive drugs; and 2) even when diagnoses are appropriate, the prescribing of psychoactive drugs may not adequately take into account the interaction between the drug and the altered metabolic capacities of the older person.

This chapter presents a description of some of the major physiologic and psychologic changes which accompany the aging process and affect the employment of psychoactive (psychotropic) agents in the geriatric population. It provides a review of current therapeutic uses and utilization of psychoactive drugs in the treatment of mental illnesses or emotional disturbances occurring in the elderly. It also reviews some physical changes that contribute to emotional problems in the aged.

A major focus is on the differences in psychoactive drug dosages required by the elderly population relative to younger age groups. Some important drug interaction effects are also reviewed. It is beyond the scope of this paper to discuss modes of therapy which are employed either concurrently with or alternative to psychoactive drug use.

The substantive portion of the paper is organized into three sections. The first section presents a discussion of how the aging process can alter the body's ability to process and utilize various psychoactive drugs. The second section is devoted to the use of psychoactive agents in the treatment of anxiety, insomnia, depression, and physiologically based psychosis in the elderly. The third section provides a summary.

THE AGING PROCESS AND DRUG USE

The aging process produces alterations in the human system which affect the absorption, transport, tissue localization, metabolism, and excretion of drugs. These physiologic changes do not occur uniformly in persons of the same chronologic age; they vary according to the number and severity of chronic diseases and pathological processes present in each individual (Salzman and Shader 1974). Therefore, both biologic and chronologic age are important considerations when administering drugs to the elderly person (Lenhart 1976). In addition, previous use of a variety of drugs may cause a predisposition to adverse drug reactions over a long lifetime. Because of the above factors, response to treatment with drugs actually becomes more diverse with increasing age (Lamy 1974). Despite the heterogeneity found in the elderly population, however, certain changes are predictable in kind, if not [illegible] degree, and have their effects on the quantity and duration of drug available at the receptor site (Holloway 1974).

The central nervous system, which serves as the receptor site for psychotropic agents, is known to be the most sensitive in terms of age-related altered responses to drug agents. In addition to the accumulation of pigment, decreases in nitrogen and phosphorous, and increases in sulfur and lipids, the aging brain undergoes a loss of neurons which varies according to phylogenetic area. Resultant disturbances in interaction and balance among the various cerebral centers lead to deterioration in integrated brain functions. This unequal rate of neuron loss is primarily responsible for the altered reactivity and sensitivity of the aged brain. Paradoxical or abnormal reactions to drugs stem from an impaired central nervous system. It is known, for instance, that in elderly patients the action of stimulants is lessened whereas the action of depressants is enhanced (Holloway 1974; Lamy 1974; Bender 1974; Salzman et al. 1976; Salzman and Shader 1974).

The sedative effect of many psychotropic agents is also more pronounced in older than in younger persons. This is probably due to increased central nervous system sensitivity, to decreased brain capacity, or both (Salzman and Shader 1974). When fewer active cells are present to act as receptors, the dose per milligram of active tissue is increased, presenting difficulties in determining the amount of drug being absorbed and utilized (Lenhart 1976). The aging central nervous system is also especially vulnerable to cerebral hypoxia resulting from hypotension and vascular disease (Holloway 1974). Oxygen consumption, a measure of cerebral metabolism, decreases with age and is probably the result of arteriosclerosis (Salzman and Shader 1974). With increasing age there is an accompanying decrease in total systemic perfusion. A reduction in cerebral blood flow occurs normally with aging but is quite pronounced in the cerebral arteriosclerotic individual (Holloway 1974). A wide variation in the clinical effect of psychotropic drugs stems from alterations in cerebral metabolism (Salzman and Shader 1974).

Venous congestion in elderly patients, due to reduced cardiac reserves, reduced cardiac output, and frequently diminished vascular elasticity associated with local atherosclerosis, serves to increase the circulation time of drugs, thus impairing their distribution and often delaying their excretion. Diminished cardiac output causes blood flow redistribution to the cerebral and coronary circulation at the expense of peripheral flow to the kidney and liver (Lenhart 1976; Salzman and Shader 1974; Baker 1974; Bender 1974).

A diminished arterial flow can hamper absorption of orally administered agents by reducing the number of available active cells, thus causing a reduction in the size of the absorbing surface. It also reduces the availability of enzymes necessary for maintaining transport mechanisms in the gastrointestinal tract. In this manner passive absorption across the intestinal epithelial membrane is reduced (Stotsky 1970; Bender 1974). Other factors related to the aging process also interfere with absorption. The reduction in mainly intracellular fluid volume, due to generalized loss of body weight, may alter absorption because of the accompanying increased sodium and decreased potassium levels (Lenhart 1976). The diminished acidity of gastric juice affects the degree of solubility and state of ionization of drugs, and a slowed stomach emptying time influences the rate at which drugs absorbed mainly from the intestine are made available to the duodenum (Holloway 1974; Lamy 1974).

Drug action is also affected by changes in blood components. Serum albumin levels frequently decline in the elderly so that protein-bound drugs are forced to compete for binding sites. This increases the ratio of free to bound drugs and results in enhanced drug toxicity. Both benzodiazepine antianxiety agents and tricyclic antidepressants are enhanced in this manner (Salzman and Shader 1974; Salzman et al. 1976; Lamy 1974).

Aging is accompanied by the replacement of functional tissue by fat, varying in increase from 18 to 36 percent in men and from 33 to 48 percent in women from age 18 to 35 years old. Psychotropic agents, which are mainly highly lipid soluble compounds, tend to be drawn by and subsequently to become localized in body fats. As mentioned above, central nervous system tissue increases in lipids with aging. Storage of lipid soluble drugs results either in their decreased intensity or increased duration of effect before they slowly return to circulation (Holloway 1974; Lenhart 1976; Stotsky 1970).

Unlike drugs of low lipid solubility, which are promptly excreted through a kidney with healthy glomerular filtration, the highly lipid soluble agents must be reabsorbed by the renal tubule and then converted to less lipid soluble metabolites (Bender 1974). Most psychotropic agents are converted to water-soluble compounds, often in the form of a glucuronide or sulfate conjugate, before excretion by the kidneys or other organs (Friedel and Raskind 1976). The rate at which this process occurs is another major determinant of the duration of activity such drugs have through the regulation of the serum or plasma level of these agents (Stotsky 1970). This biotransformation procedure is centered in the microsomal fraction of the liver cells and is dependent upon the level of enzyme activity in this area. Evidence strongly suggests that there is a varying reduction in microsomal metabolism with increasing age. Either because of a decrease in the rate of synthesis or because of an alteration in enzyme structure, the activities of several circulating enzymes, such as cholinesterase, are diminished (Lamy 1974; Lenhart 1976).

The aging kidney experiences reductions in renal blood flow, glomerular filtration, and tubular secretory capacity. The functional decrement may range from 20 percent to 50 percent in relatively healthy older persons, and only a few persons 70 years and older are without some degree of renal pathology. Diminished hepatic and renal function can each prolong the plasma half-life of drugs with a resultant increasing risk of drug toxicity and drug interactions (Lamy and Vestal 1976; Bender 1974; Lamy 1974).

Homeostatic capability declines with increasing age. The adjustments of secondary systems and their effect on drug activity are diminished and only a small change is needed to create disequilibrium in one or several processes. The aged population's impaired capacity to handle orthostatic stress, for example, can be further taxed by the administration of phenothiazines and antidepressants. Postural hypotension is very often the result (Bender 1974; Baker 1974; Holloway 1974). Abnormal chain or paradoxical drug reactions can stem from an impaired reserve capacity of tissues that are less able to withstand temperature changes as well as fluid and electrolyte loss (Lenhart 1976; Baker 1974).

Generally, the combined effects of aging on the various systemic functions act to slow down or impair the body's processing of psychotropic drugs; accordingly, these agents have a prolonged action time before they are eliminated from the system, although the degree of variation differs among individuals. Also, the wastage of muscle tissue and subsequent fat substitution which accompanies aging results in a decrease in total body volume. Both factors indicate the necessity for lower dosage levels (Hall 1975; Baker 1974; Freeman 1974).

Finally, the practice of polypharmacy in treating elderly patients is common and is brought about by multiple pathologic conditions occuring with a myriad of symptoms. However, this practice may invite an increase in adverse drug reactions as well as decreased compliance (Davison 1975).

In summary, changes in the central nervous system, arterial and venous flow, blood components, the ratio of functional tissue to fat, renal flow, and homeostatic capability can have significant effects on the metabolism and elimination of drugs in elderly patients. The specific nature of the effects those factors may have will depend upon the characteristics of individual drugs, drug groups, and drug combinations.

DRUG TREATMENT OF EMOTIONAL DISTURBANCES OR MENTAL ILLNESS

DRUG TREATMENT OF ANXIETY

Anxiety is a common reaction to the various problems and dilemmas accompanying the aging process and may coexist with feelings of depression. Anxiety may be manifested in hypochondriasis or it may be the cause of agitated or hostile, aggressive behavior. A chronically anxious state can add to the severity of depression, insomnia, and behavioral reactions as well as have a worsening effect upon concurrent physical disease states (Lifshitz and Kline 1970).

Antianxiety agents, such as minor tranquilizers or anxiolytics are a group of chemically heterogeneous compounds that produce similar clinical effects and that possess, in varying degrees and frequently in combination, anxiety-relieving, sedative, and skeletal muscle-relaxant properties (Fann et al. 1976; Markoff et al. 1974). It should be noted that hypnotics, or sleep-producing agents, are to a considerable degree interchangeable with antianxiety agents in their effect, depending on dosage level. They share the pharmacological property of central nervous system depression whereby progressively larger doses, the amount varying from agent to agent, can lead to drowsiness, sleep, and finally a coma state (Greenblatt and Shader 1974a).

Although not ideal agents, the benzodiazepine derivatives are considered the most effective of all currently available anxiolytics (i.e., anxiety-reducing agents) for both young and old patients and have replaced barbiturates and the propanediols (e.g., meprobamate and tybamate) as the antianxiety agents of choice. Chlordiazepoxide (Librium), diazepam (Valium), and oxazepam (Serax) are the most frequently used benzodiazepines (Markoff et al. 1974; Greenblatt and Shader 1974b; Salzman et al. 1976). Each of the derivatives possesses, in varying degrees, anticonvulsant, sedative-hypnotic, anxiolytic, and muscle-relaxant effects (Ayd 1975). They have moderate addiction potential, and overdoses usually do not result in serious poisoning. When used to treat anxiety they are less apt to cause undesired drowsiness than equivalent doses of either barbiturates or meprobamate (Greenblatt and Shader 1974a). However, elderly persons are more susceptible to their sedative side effects (Salzman et al. 1976). Another advantage of the benzodiazepine derivatives is that, unlike barbiturates, they do not alter the blood levels of concomitantly administered tricyclic agents, which are sometimes needed during initial treatment of endogenous depression (Shader 1976). Certain side effects that accompany central nervous system depression are more dangerous for elderly persons. Muscle weakness and ataxia are especially threatening to a population more predisposed to falls. Dysarthria (difficulties in speech articulation) may also occur. Older persons are also more vulnerable to a paradoxical reaction associated with the use of Librium, sometimes referred to as "Librium rage." As the name suggest, irritability and hostility are somehow increased (Lenhart 1976; Appleton 1976). Diazepam may have the strongest antidepressant effect of these agents, at least for elderly males with mild anxious depressions (Salzman et al. 1976; Fann and Wheless 1975). Fairly recent findings about oxazepam suggest that it may offer unique benefits to the elderly population. It, unlike chlordiazepoxide and diazepam, is rapidly biotransformed to an inactive product, and because it does not accumulate and build up toxic effects, it is the more appropriate drug choice for chronic therapy (Greenblatt and Shader 1974a; Merlis and Koepke 1975).

The use of antihistamines, such as hydroxyzine (Vistaril, Atarax), as either antianxiety agents or as hypnotics, particularly in elderly patients, is inadvisable. These agents, metabolized by the liver, have anticholinergic effects that can produce the already described symptoms of atropine-like toxicity. Their nonspecific sedative effects are only a secondary pharmacologic property (Greenblatt and Shader 1975; Greenblatt and Miller 1974; Modell 1974). The propanediols, such as meprobamate (Miltown) and tybamate (Tybatran), are another group with questionable efficacy and safety in the control of anxiety. Meprobamate usage can easily lead to addiction, and overdoses can cause serious poisoning (Greenblatt and Shader 1974b).

Barbiturates are a poor drug choice when an antianxiety effect is needed. Their efficacy in this area is highly variable and often inadequate as their effect is to produce a general central nervous system depression which has little focus on anxiety (Greenblatt and Shader 1974a).

DRUG TREATMENT OF INSOMNIA

Insomnia, a very common complaint of elderly patients, is typified by symptoms such as increased time required to fall asleep, frequent nightly awakenings, increased frequency of dreaming, lighter sleep, and an increase in total bed time with an accompanying decrease in total sleep time. Findings of all-night electroencephalographic recordings support the notion that stages of deep sleep diminish steadily in their intensity with advancing age (Amin 1976). Oxazepam, because of characteristics described earlier, is thought by some to be helpful for complaints centering around restlessness at night and/or early morning awakening; it is rapidly absorbed and has a relatively short duration of action. Use of oxazepam is contraindicated in cases where patients have been chronic barbiturate or other soporific users since previous experience with those drugs diminishes the effectiveness of ordinary doses of oxazepam (Ayd 1975). Dosage levels are best administered in accordance with the tolerance of each individual patient.

Barbiturates have serious limitations when used as hypnotics for elderly patients. Habituation and addiction can easily occur at doses only slightly higher than prescribed, and intentional or unintentional overdose can easily cause deep coma and death. Through possible depression of folic acid and vitamin B-12 levels, they may cause depression, toxic psychosis, and apparent dementia. Their use is contraindicated during pneumonias or cerebrovascular episodes due to their depressant effect on vital brainstem centers. Their tendency to accumulate and produce toxic delirium makes them a poor choice for patients with impaired renal function (Greenblatt and Shader 1974a; Morrant 1975; Dawson-Butterworth 1970). All barbiturates, but especially phenobarbital, accelerate liver microsomal metabolism of drugs (such as certain of the antipsychotic phenothiazines, the tricyclic antidepressants, warfarin, coumarin, and diphenylhydantoin), resulting in a lowering of their clinical effects (Fann 1976; Ayd 1975).

The piperidinedione hypnotics, glutethimide (Doriden) and methyprylon (Noludar), are similar to barbiturates in chemical structure and should also be avoided; glutethimide is likely to cause cerebellar signs and osteomalacia due to vitamin D deficiency, as well as being extremely difficult to treat in overdose situations (Morrant 1975; Dawson-Butterworth 1970). It also accelerates liver microsomal metabolism, and addiction can easily occur (Greenblatt and Miller 1974). Barbiturates, glutethimide, and methyprylon are potent REM depressors, and withdrawal may lead to REM rebound with intensified insomnia and nightmares. REM rebound in elderly patients is particularly undesirable, since anginal attacks and cardiac arrhythmias, as well as confusional episodes with vivid hallucinations, occur with greater frequency during REM sleep. Patients experiencing REM rebound symptoms may return to drug use as a source of relief and in this manner build up dependency (Modell 1974; Amin 1976; Greenblatt and Miller 1974).

The quinazolone derivative methaqualone (Quaalude) also causes intense REM depression, as well as physiological addiction when administered in essentially therapeutic doses. Lately it has been recognized as a drug possessing strong abuse potential, and there is some evidence that it accelerates liver microsomal metabolism (Fann and Wheless 1975; Modell 1974; Greenblatt and Miller 1974).

Chloral hydrate, predecessor to the barbiturates and in use for over a century, does not appear to depress REM sleep, although some reports are conflicting. It acts fairly quickly with rapid metabolism in the liver as well as other tissues; therefore, it is only contraindicated in cases where renal or hepatic disease are marked and in patients with severe cardiac disease. This and other chloral derivatives are seldom abused or utilized in cases of intentional overdose, possibly because of their gastric irritant properties. These are the only hypnotics that can cause protein-binding displacement, leading to an increased concentration of the pharmacologically active unbound faction of the displaced drug. This results in a transient potentiation of the other protein-bound drugs. When a chloral derivative is concomitantly administered with warfarin or bishydroxycoumarin, transient excessive hypothrombinemia can occur. Similar interactions with drugs such as diphenylhydantoin, phenylbutazone, or imipramine could potentially occur but are as yet inadequately documented (de Groot 1974; Morrant 1975; Modell 1974; Greenblatt and Miller 1974).

The benzodiazepine flurazepam has little effect on REM sleep, and like chloral hydrate, only minimally accelerates liver microsomal metabolism. In terms of abuse and overdosage it may be the least hazardous of all the hypnotics. It does produce a reduction in slow-wave sleep, however. Insomnia associated with hyperthyroidism and uremia is accompanied by a reduction in slow-wave sleep, and flurazepam may further complicate this type of insomnia. It is possible that flurazepam could produce cumulative or residual clinical effects. Its major metabolite, which possesses significant central nervous system depressant activity, accumulates significantly and remains in the blood for several days after drug therapy termination (Amin 1976; Greenblatt and Miller 1974).

DRUG TREATMENT OF DEPRESSION

Depression, when appearing in older persons, shares many characteristics of the illness experienced by younger persons. In both old and young, depression has an episodic nature, a tendency to remit, and a potential for favorable immediate outcome (Prange 1973; Epstein 1976), although depression may vary in severity and duration. In cases of situational or reactive depression, a person may be responding to a temporary loss or rejection; the failure of the depressive syndrome to spontaneously remit after a year or more can be an indication of pathology (Greenblatt and Shader 1975). In cases of endogenous depression, the onset of depression may occur without obvious cause or sufficient basis to explain the severity of symptoms (Greenblatt and Shader 1975).

Depression in elderly patients is often misdiagnosed. Incontinence, confusion, disorientation and apathy are symptoms in both senility and depression (Fann and Wheless 1975). Undernutrition, which can result from a depressed, apathetic state, is often the cause of a confusional state (Epstein 1976). A worsening depression can produce signs of retardation, memory defect, and cognitive impairment. Moderate to severe depressions, with minimal organic brain disease, are often misdiagnosed as chronic brain disease accompanying either cerebral arteriosclerosis or senile brain disease (Fann and Wheless 1975; Epstein 1976).

Depression in elderly patients may be unrecognized as well as misdiagnosed. The clinical picture for these patients more typically lacks the dramatic presentation of a younger depressed person. An air of apathy, inertia, introversion, self-deprecation, and unwillingness to communicate are often regarded as normal behavior for an elderly person. Even when depression is identified it is often thought of as a normal or realistic response to the physical and emotional stresses accompanying aging (Hodkinson 1975). Endogenous or manic-depressive disorders coinciding with chronic physical illness can be overlooked and left untreated in this manner (Epstein 1976).

Approximately 20 percent of the population 65 years and older suffers from some form of psychiatric disorder, and it is important to realize that functional disorders, whether precursors to chronic brain disease or not, predominate in those over age 70. The greater incidence of depression with advancing age is not surprising. The aged population suffers the loss or diminution of occupation, income, status, health, and loved ones at a time in life when adapting and coping abilities are also diminished due to cerebrophysiologic changes. Sociopsychologic changes which accompany advancing years constitute a more frequent exposure to depression-precipitating circumstances. The elderly person is called on to cope when recuperative ability, resilience, energy, and general homeostatic capacity are reduced. Reactive depressions to illness, bereavement, and other losses are common, but many older persons also have had a history of recurring depressive episodes throughout their life. Also, latent or existent neurotic conditions can be aggravated by old age (Fann and Wheless 1975).

From the above, it can be concluded that the depressed older individual can have a variety of symptoms emanating from a wide range of conditions and circumstances. Prompt treatment can be essential for elderly persons because the illness may be severe, prolonged, and likely to recur. The risk of suicide is considerable, and attempts by elderly persons are often successful (Young 1972).

Treatment of depresion in elderly persons is generically similar to treatment of younger patients. Antidepressant drugs are the major treatment choice for moderate and severe depressions. Accurate diagnosis is essential for appropriate treatment choice. Endogenous depression may be manifest on a constant basis or it may be only one phase of a "bipolar" affective (manic-depressive) disease; psychomotor agitation and hyposomnia are characteristic of the former, while psychomotor retardation and hypersomnia characterize the latter (Greenblatt and Shader 1975; Shader 1976). Middle-aged or elderly patients with endogenous depression may have one or more of the following characteristics: prolonged or severe symptoms; a history of depressive episodes; a family history of similar symptomatology; no obvious precipitating cause; anorexia or weight loss; early morning awakening; and sexual disinterest or dysfunction (Greenblatt and Shader 1975). Prompt and energetic treatment of endogenously depressed elderly patients is particularly imperative because the condition can last for 2 years or longer. It is also accompanied by a high suicide risk, potential malnutrition, and subsequent permanent memory impairment and the incurring of an acute confusional state (Kral 1976).

The tricyclic antidepressants currently are the preferred drug agents for treatment of endogenous depression, followed by the generally less effective and more toxic monoamine oxidase (MAO) inhibitors (Young 1972; Greenblatt and Shader 1975; Lifshitz and Kline 1970; Fann and Wheless 1975; Fann 1976; Markoff et al. 1974; *Medical Letter on Drugs and Therapeutics* 1975). The tricyclics have, since their introduction in 1958, retired the MAO inhibitors to a fairly minor role (Fann and Wheless 1975; Frazier 1976; Fann 1976). The tricyclics act to block the neuronal uptake into presynaptic nerve endings, thus having direct action on sympathomimetic amines in the brain (e.g., norepinephrine) and indirect action on catecholamine-releasing substances (e.g., tyramine). Although both the tricyclics and MAO inhibitors specifically act on the biology of amines, the former has little inhibitory effect on monoamine oxidase (Frazier 1976). A wide variety of tricyclics are currently available in the United States. Some are nonsedating, such as protriptyline, imipramine, desipramine, and nortriptyline, and are more appropriate for treating retarded or withdrawn depressions characterized by hypoactivity and hypomentation. Those with a sedative effect, such as amitriptyline or doxepin, are more therapeutically appropriate for treating agitated or hyperactive depressive states (Fann and Wheless 1975; Fann 1976; Hollister 1976). With the exception of protriptyline, which acts as a stimulating drug, all possess anxiolytic properties which are of great help when endogenous depression is accompanied by anxiety. Excepting the more potent protriptyline and nortriptyline, all possess about equal potency on a milligram basis and a narrower, barely threefold, dose range, compared to the larger ranges of other psychotropic drugs (Prange 1973). There is considerable lag time, usually from 1 to several weeks, before tricyclic antidepressants attain a sufficient blood level for therapeutic results (Fann 1976; Greenblatt and Shader 1975; Fann et al. 1976). The lag time can be interpreted as a serious drawback in the treatment of extremely depressed, strongly suicidal patients (Fann 1976; Hollister 1976). Attempts to shorten this period through simultaneous administration of stimulant compounds or thyroid hormones and androgenic agents, as well as parenteral administration (i.e., of amitriptyline and imipramine), are either considered not promising for a routine practice or evidence is indeterminate concerning their effectiveness.

It is generally recommended that dosage levels of tricyclic antidepressants begin at a lower level and increase at a more gradual rate when administered to elderly persons (Fann 1976). However, a strictly rigid adherence to this recommendation could sometimes prevent older patients from receiving a sufficiently high, yet still tolerated therapeutic level (Prange 1973). Genetic differences in the ability to concentrate tricyclics do exist and it is wise to routinely monitor patient blood levels (Frazier 1976). Prescription amounts of tricyclics should never exceed roughly a week's supply at one time, as overdoses are often fatal. Elderly patients deemed suicidal or forgetful should not be allowed to self-administer these agents (Hollister 1976; Schmidt 1974). The affinity of tricyclics for tissue and plasma proteins makes them nearly impossible to dialyze in emergency situations (Frazier 1976).

The potential side effects of the tricyclics are numerous. They, along with all antipsychotic agents as well as antiparkinsonian drugs, possess anticholinergic properties which can produce atropine-like effects, among these a central anticholinergic confusional reaction which occurs more commonly in elderly patients. Symptoms are a marked disturbance of short-term memory, disorientation, impaired attention, anxiety, and visual and auditory hallucination (Davis 1974; Hollister 1976). This deliriform psychotic state is often mistakenly interpreted as an increase in psychiatric symptoms, and dosage levels are elevated still further (Fann 1976). The elderly, due to a diminution of liver metabolism rates, are particularly vulnerable to peripheral anticholinergic effects as well (Prange 1973). A dry mouth, often considered the least dangerous atropine effect, can cause problems with dentures, can increase the wearing away of the gingiva and natural teeth, and if severe enough can cause acute parotitis. Another effect, the inhibition of bowel motility, can lead to constipation, followed by fecal impaction and paralytic ileus. Micturition can easily develop into acute retention of the urine, and both urinary and bowel problems can worsen anxiety in compulsive patients. Paralysis of visual accommodation can aggravate unsuspected and untreated cases of narrow-angle glaucoma. These drugs are particularly hazardous in patients with a history of seizures, urinary retention, prostatic hypertrophy, increased intraocular pressure, narrow-angle glaucoma, or intestinal obstruction (Greenblatt and Shader 1975; Fann 1976; Morrant 1975; Schmidt 1974; Hodkinson 1975). Mydriasis as well as tachycardia can also occur (Medical Letter on Drugs and Therapeutics 1975). Dryness of the mouth, along with two other common side effects, drowsiness and blurred vision, seems to wear off relatively soon after treatment initiation (Schmidt 1974). It is worth mentioning that the sedating antidepressants as well as the antipsychotics can indirectly cause bronchopneumonia in elderly patients by causing upright motionless daytime dozing with resultant decrease in respiratory efficiency (Morrant 1975).

When tricyclics are first administered they also exert a hypotensive effect, causing a danger of orthostatic hypotensive episodes which can easily lead to falls and subsequent injuries in frail older patients. Particularly when cerebral or myocardial ischemia is present, a sudden drop in blood pressure can produce serious infarctive lesions (Young 1972; Fann 1976; Morrant 1975). Great caution must be used in administering tricyclics to such patients, and especially to those with a history of arrhythmias. Tricyclics are known to produce changes in the EKG, such as a lengthened Q-T interval and the production of prominent U-waves. Thus ventricular repolarization is prolonged and the falling of a ventricular premature contraction on this extended period may set off ventricular tachyarrhythmias. Evidence exists that death from arrhythmias can occur in overdose situations involving patients with cardiac disease. The use of these drugs only rarely precipitates congestive heart failure and cardiomyopathy. All patients with any preexisting cardiac disease or abnormalities should be given a base-line electrocardiogram before tricyclic administration is begun and elderly patients in particular should be carefully screened (Lutz and Wayne 1976; Hollister 1976). Parkinsonian syndrome manifestations such as tremor or akathisia (inability to sit still) can develop on high dosage levels of tricyclics. The best treatment is to lower the dosage level (Morrant 1975; Prange 1973). All major side effects of the tricyclics can be relieved by terminating their use (Schmidt 1974).

Patients on tricyclics who are taking antihypertensives such as guanethidine (Ismelin) and bethanidine, which block the adrenergic neuron, will experience a reversal of the antihypertensive effect 12 hours or more after tricyclic administration (Morrant 1975; Davis et al. 1973; Fann 1976; Fann 1973; Greenblatt and Shader 1975). The norepinephrine pump in the adrenogenic neuron membrane is blocked by the tricyclics so that guanethidine is not carried to its active site within the neuron. Although all tricyclics at least partially antagonize this agent, some evidence suggests that doxepin may do so only minimally. Because the antihypertensive agent methyldopa (Aldomet) does not utilize the norepinephrine pump for transport to the neuron, its activity is not affected by the tricyclic compounds (De Groot 1974; Prange 1973; Greenblatt and Shader 1975).

The activity of tricyclics is potentiated by thyroid hormone and by the enzyme inhibitor methylphenidate, the latter inhibiting microsomal enzymes and thereby slowing tricyclic metabolism with a resultant rise in tricyclic blood levels. Recently these combinations have been used to enhance the effect of tricyclics, but their efficacy and safety is still questionable. Secobarbital induces enzymes, with a resultant lowering of tricyclic blood levels. Major tranquilizers and estrogens also inhibit metabolism. Results from studies on how tricyclic drugs alter the metabolism of other agents are contradictory and inconclusive (Shader 1976; Greenblatt and Shader 1975; Frazier 1976). However, pertaining to their effects on absorption, it is known that by reducing gastrointestinal motility they delay or reduce the absorption of phenylbutazone and levadopa. Both the tricyclics and the antipsychotic agents called phenothiazines increase their own absorption by decreasing gut motility. Through their slowdown of the gastric emptying process they may, in turn, enhance the absorption of digoxin (Hall 1975; MacLennan 1974; Greenblatt and Shader 1975).

It should be noted that in the case of severely agitated or markedly paranoid depressed patients, or those with suspected schizophrenia, it may be necessary to treat with a tricyclic and an antipsychotic drug combination (Schmidt 1974). One of the phenothiazines, thioxanthenes, or butyrophenones is appropriate but must be used with extreme caution due to the combined anitcholinergic properties of these drugs (Fann and Wheless 1975; Kral 1976; Schmidt 1974). Amitriptyline and perphenazine are the most commonly prescribed combination for this purpose (Shader 1976).

The MAO inhibitors, e.g., isocarboxazid, pargyline, phenelzine, and trancylcypromine, although seldom the initial treatment choice for elderly patients, are sometimes successful in severe depressions where treatment with tricyclics has failed to gain desired results (Fann 1976; Frazier 1976; Webb 1971; Kline 1974). These agents increase norepinephrine at the receptor site by blocking its intracellular degradation (Appleton 1976). The correlation between a decrease in MAO levels and antidepressant effects as well as the finding that brain MAO activity increases with age are indicators of the efficacy these drugs possess for certain elderly patients (Fann and Wheless 1975; Fann et al. 1976; Nies et al. 1973).

The changeover from a tricyclic to an MAO inhibitor should be made only after a 10- to 14-day drug-free interval (Prange 1973; Webb 1971; Schmidt 1974). Concurrent use of the two drug classes is not recommended, although there is some dispute over the reliability of evidence supporting their enhancement of each other's toxicity. However, hyperpyretic crises (high fevers), severe convulsions, and death have been reported as a result of this combination (Greenblatt and Shader 1975; Schmidt 1974; Medical Letter on Drugs and Therapeutics 1975). A lag time before onset of therapeutic action also seems to occur with these agents--although its existence is not uniformly accepted. Patients displaying psychomotor retardation particularly benefit from these drugs. However, immediately after treatment onset, the anxiety of a more agitated patient may either be increased or go unrelieved (Fann 1976; Markoff 1974; Kral 1976).

The potential side effects and the necessary precautions involved with the administering of MAO inhibitors are numerous. Among the possible side effects are anxiety, agitation, manic symptoms, worsening of psychotic episodes, constipation, edema, nausea, diarrhea, abdominal pain, weakness, drowsiness, tachycardia, blurred vision, impotence, chills, and headaches (Fann and Wheless 1975). These agents may block cardiovascular response, increasing the exercise tolerance of patients with angina pectoris and myocardial insufficiency to the point, if unwarned, of risking myocardial infarction (Webb 1971). Hypotension is also a frequent problem, and use of these drugs can lead to hepatocellular damage as well (Appleton 1976; Medical Letter on Drugs and Therapeutics 1975; Webb 1971; Kral 1976).

MAO inhibitors offer further disadvantages. They are interactively toxic with numerous other drugs and with certain foodstuffs as well. They potentiate the action of anesthetics, barbiturates, adrenal corticosteroids, ganglion-blocking agents, morphine, atropine, and 4-amino-quinoline compounds. The antidepressant and hypotensive effects of MAO inhibitors are, in turn, potentiated by diuretics (Fann and Wheless 1975). The use of sympathomimetic amines, which are common ingredients of over-the-counter cold and sinus drugs as well as analgesics, is contraindicated. MAO inhibitors potentiate pressor amines so that a severe to fatal hypertensive crisis can occur. Another such pressor agent, tyramine, which releases endogenous sympathetic amines, is also potentiated. It is found in a wide range of foods whose consumption is contraindicated, such as cheese, chicken liver, avocado, meat extracts, beer, sherry, or Chianti (Lifshitz 1970; Throne 1974; Fann 1973). Older persons, besides having a greater likelihood of being somewhat hypertense, are apt to have a more difficult time remembering and observing all the precautions and restrictions that accompany therapy with MAO inhibitors (Young 1972). Also it is more likely that elderly patients will be taking one or more of the contraindicated medications (Lifshitz and Kline 1970). A further complication is that, unlike the tricyclics, side effects occurring with MAO inhibitor therapy may be long lasting, and harmful interactions with other drugs or foodstuffs are still possible as long as 2 weeks after treatment termination (Medical Letter on Drugs and Therapeutics 1975; Appleton 1976).

Clinically derived estimates of the incidence of mania in the aged population vary considerably. One study estimates that this disorder comprises only 0.6 percent of the functional disorders found in this population while another refers to recurrent manic or manic-depressive episodes as a syndrome frequently encountered in this age group (Prange 1973; Davis et al. 1973).

Lithium carbonate has been used since 1949 in the treatment of cyclic affective disorders and the consensus seems to be that it is prophylactic in recurrent bipolar depressions for both manic and depressive phases (Young 1972; Medical Letter on Drugs and Therapeutics 1975; Davis et al. 1973; Markoff 1974; Schmidt 1974). However, there is a diversity of opinion regarding its effectiveness in treating acute mania attacks (Markoff 1974; Young 1972; Davis et al. 1973; Appleton 1976). Its successful treatment of the depressed phase may often require the concomitant administration of a tricyclic drug (Shader 1976; Hollister 1976; Frazier 1976). Here, too, there is conjecture about its efficacy in the actual treatment of acute depressive episodes (Appleton 1976; Schmidt 1974). Some evidence points to the usefulness of lithium as a prophylactic for endogenous depressions (Fann 1976).

Two major contraindications to the long-term, prophylactic use of lithium are the presence of renal disease and cardiac insufficiency, which occur with great frequency in elderly patients (Young 1972). Rapid salt depletion during lithium treatment can cause gastrointestinal, central nervous system, and neuromuscular toxicity. Therefore, diuretic therapy, required for several concurrent conditions occurring in elderly patients, is contraindicated. The half-life of lithium is considerably longer in elderly patients, so that smaller dosage levels are sufficient to build up an adequate therapeutic blood level. Lithium toxicity and an accompanying confusional syndrome can occur at lower blood levels in the elderly patient. Careful and continuous monitoring of blood levels is particularly important when the outpatient is elderly as the earlier signs of toxicity can be passed off by family and neighbors as lapses to be expected with old age (Fann 1976; Schmidt 1974; Davis et al. 1973; Fann 1973).

Finally, the use of stimulant compounds as antidepressants has not met with great success, and these are especially dangerous when administered to elderly patients. Their cardiovascular effects, including increased blood pressure and tachycardia, are particularly dangerous in cases where cardiovascular function is compromised and there is an increased vulnerability to cerebrovascular accidents. Generally, their mood-elevating effect is quite often followed by a depression which is more severe than the original one (Fann and Wheless 1975).

TREATMENT OF PHYSIOLOGICALLY BASED PSYCHOSES

A broad, heterogeneous group of psychotic conditions, consisting of varying psychopathologies, are known to occur in the aged population (Friedel and Raskind 1976). Organic brain syndrome manifestations, for example, appear in approximately 16 percent of persons aged 65 and over. There are two forms of the disease. Senile psychosis, or dementia, is causally related to organic disease of the nerve cells. Arteriosclerotic psychosis, or dementia, is associated with focal indications of cerebrovascular disease.

The latter condition is present in about one-third of the organic brain syndromes which occur in elderly persons. It acts as a major contributor to pathologic conditions in only 10 percent of the above (Hollister 1975; Fann 1976). Unlike senile psychosis, cerebral arteriosclerosis often occurs before age 65. It is only infrequently found in patients younger than age 55. The condition produces pathological changes in the form of small infarcts. These can appear as glial proliferation with only patches of scarring, or a number of small pseudocysts can be produced which give a Swiss cheese appearance to a "brain slice" (Hollister 1975). Onset is said to be more abrupt than senile psychosis, although headaches, dizziness, and fainting spells are often part of the patient's history in the months preceding onset (Prien 1972). An increase in stressful conditions may cause a sudden appearance of symptoms. The illness fluctuates in severity, sometimes changing in a matter of hours, and is accompanied by emotional lability and/or epileptiform seizures and also sleep disturbances. Its variability is probably due to changes in circulation. Since insight usually remains intact, the patient is often acutely depressed or anxious about his mental deterioration. As the illness worsens, the more subtle or complex aspects of personality tend to be destroyed and memory, intellectual function, and judgment-making ability progressively decline. About 20 percent of cases develop paranoid syndromes. Death, usually a result of cerebrovascular accident, myocardial infarction, or infection, may not occur until years after disease onset and several periods of improvement and decline (Fann et al. 1974; Prien 1972; Fann 1976; Whanger 1973).

Senile dementia normally occurs in the seventh to ninth decades and strikes women more frequently than men (Fann 1976). Two types of nerve cell lesion can occur: senile plaques, or clusters of enlarged, abnormal nerve fibers and synaptic endings, and the neurofibrillary tangles of Alzheimer, made up of twisted intraneuronal fibers (Hollister 1975). The latter is most often associated with presenile, i.e., before 60, dementia (Prien 1972). The etiology of senile dementia is unknown (Hollister 1975). Vague feelings of anxiety and depression frequently precede its onset, which is often insidious and marked by a progressive loss of memory for recent events. Depression tends to fluctuate and then disappear as the dementing process takes hold. Memory failure is accompanied by intellectual impairment, disorientation, and poor judgment (Prien 1972). The early stages may be somewhat indistinguishable from the normal aging process. However, deterioration subsequently proves to be more rapid and profound and is accompanied by higher mortality (Fann 1976). Unsteady gait, muscular weakness, fatigue, and speech disturbance may develop. Paranoid reactions may occur in 15 to 20 percent of cases. Prognosis is usually poor. Diffuse pathological changes occur over a number of years, leading to a total disorganization and degradation of behavior which requires institutional care. Heart failure or pneumonia are common cause of death (Prien 1972; Fann 1976).

A combination of these syndromes occurs in over 20 percent of cases. Paranoid behavior manifests in 35 percent of patients with dual pathologies. It should be noted that the patient's psychological makeup determines the nature of any secondary reaction to mental impairment accompanying either of these conditions. Depression or agitation, withdrawal, strong persecutory and expansive reactions, or the absence of any marked response are all possible behavioral patterns (Fann et al. 1974; Whanger 1973; Prien 1972).

Schizophrenia is another form of psychosis which occurs in elderly patients. Some patients may have been ill for several years preceding old age and are episodic psychotics, whereas onset in others occurs after age 65 (Davis 1974; Davis et al. 1973). The illness can be either functional or organic so that the later occurring type, often called late paraphrenia, can develop either as a consequence of organic brain syndrome in predisposed persons, or can occur independent of such deterioration. With this illness, an intact personality with well-organized paranoid delusions is frequently accompanied by symptoms of passivity or by classic auditory hallucinations, much like the clinical description of early onset schizophrenia (Fann 1976; Fann et al. 1974; Young 1972). Cases of schizophrenia developing after age 60 and independent of dementia comprise only 5 percent of all schizophrenic illness. Evidence suggests a possible hereditary predisposition. Patients are often healthy and able to ward off dementia. However, if the schizophrenic condition is left untreated, a prolonged course can be anticipated (Whanger 1973).

The treatment of psychoses in elderly patients involves use of the same antipsychotic agents commonly administered to younger patients. Numerous double blind studies offer sound evidence of their efficacy in treating geriatric patients (Davis et al. 1973; Davis 1974). However, starting doses should be reduced by one-third to one-half the amount given to young patients and dosage buildup should be more gradual (Prien and Caffey 1974). These agents are helpful in relieving symptoms such as agitation, violent and irrational behavior, and typical perceptual disturbances. They do not, however, alter the course of any underlying organic disorder. Their effect is achieved mainly through blockage of central adrenergic and dopaminergic synapses, resulting in a decrease in membrane excitability (De Groot 1974; Eisdorfer 1975).

The phenothiazine derivatives are by far the most commonly administered antipsychotic agents for relief of chronic brain syndrome and schizophrenic symptoms occurring in elderly persons (Prien 1972; Fann 1976; Friedel and Raskind 1976; Schmidt 1974; De Groot 1974). Although they exhibit a diversity of pharmacologic actions, they almost all share the ability to exert a calming effect without severely impairing motor function or forcing sleep on the patient. This is probably because their chief locus of action is the subcortical brain (Eisdorfer 1975). Exceptions are thioridazine and chlorpromazine which can produce drowsiness (Prien 1972). These agents are classified by chemical structure into three side chains; aliphatic derivatives, such as chlorpromazine (Thorazine); piperidine derivatives, such as thioridazine (Mellaril); and piperazine derivatives such as trifluoperazine (Stelazine) (Greenblattt and Shader 1974b).

Numerous side effects can accompany the use of these agents. All initially produce a degree of orthostatic hypotension (drop in blood pressure on standing up). But this effect is particularly strong with chlorpromazine and thioridazine. They are also more likely to provoke seizures and thioridazine, in high doses, can cause irreversible retinal damage stemming from segmentary retinopathy. Other possible dose-related side effects are jaundice, agranulocytosis, dermatitis, and photosensitivity. Epilepsy and mental depression may become potentiated, a drop in body temperature can occur, sometimes causing hypothermia in elderly patients, and cerebral anoxia may be exaggerated. These agents can also suppress thyroid function (Lamy 1974; Markoff et al. 1974; Holloway 1974; Greenblatt and Shader 1974b). Their possession of anticholinergic properties and resultant atropine-like symptoms are similar to the tricyclic antidepressants. Elderly organic brain syndrome patients are particularly vulnerable to the confusional state which can result from central nervous system toxicity (Friedel and Raskind 1976). Rare side effects, such as hepatic toxicity and blood dyscrasias, occur with greater frequency in elderly patients (Prien 1972; Webb 1971). Like the tricyclic antidepressants, phenothiazines are capable of producing a cardiomyopathy that is especially dangerous to patients with heart disease. Electrocardiographic abnormalities of a nonspecific, reversible, and perhaps benign nature, are produced by several of the phenothiazines. These alterations are disproportionately high with thioridazine. Cases of cardiac toxicity have been associated most often with this drug, and to a lesser degree with chlorpromazine. Excessive dosage levels of thioridazine have been suspected of causing supraventricular arrhythmias, conduction defects, and ventricular arrhythmias (Friedel and Raskind 1976; Prien 1972; Lutz 1976).

All antipsychotic agents can produce extrapyramidal side effects. Acutely or early in treatment, parkinsonism, acute dystonias, akinesias, and akathesias can occur. Later in treatment (usually years after initiation of therapy, but can also be a matter of months), tardive dyskinesia can develop. Half of patients over age 60 experience extrapyramidal side effects, and 90 percent occur during the first 10 weeks of treatment (Holloway 1974). They probably stem from blockage of dopamine receptor sites in the basal ganglia (Greenblatt and Shader 1974b). Thioridazine seems to cause relatively fewer of these symptoms. The piperazine derivatives are the most potent and activating phenothiazines, and also the most likely to cause extrapyramidal symptoms, in particular akathisia (Prien 1972). Patients with this condition feel unable to sit or stand still. Their motor restlessness is frequently mistaken for psychotic agitation, and dosage levels are increased when they should be lowered (*Medical Letter on Drugs and Therapeutics* 1975). Chlorpromazine, although particularly effective in controlling agitation and hyperactivity, incurs a greater risk of parkinsonian reactions such as tremors, muscle weakness, and rigidity (Prien 1972). This syndrome, the most commonly experienced extrapyramidal side effect in elderly patients, can occur in a mild form or else can be clinically indistinguishable from either postencephalitic or idiopathic parkinsonism. Antiparkinsonian medicines have often been administered to elderly users of antipsychotics as a prophylactic measure. This practice is unwise due to the combined anticholinergic action of these agents. Not all patients will develop this condition, and the surfacing of symptoms can serve as a guide for dosage mediation. When this condition emerges, drug dosage can be lowered and/or antiparkinsonian agents administered. Continued need of all medication should be reviewed periodically.

Tardive dyskinesia appears in a significant proportion of older patients, especially women, and most often emerges after years of treatment with antipsychotics. Sometimes it appears only after drug treatment has been withdrawn or drastically reduced. The condition consists of buccal-facial-mandibular and buccal-lingual movements along with involuntary choreiform limb and occasionally trunk movements. It can persist indefinitely or gradually remit, but does not progressively worsen after drug withdrawal or minimal dose administration. The etiology of this appears to be a denervation sensitization of dopramine receptor sites. Elderly persons with a history of treated psychosis are especially at risk because they may have received high doses over long periods of time. Persons with brain damage are also more vulnerable. Drug holidays are strongly recommended during long-term use of antipsychotics along with lowered doses of these agents as a way to minimize the build-up of these symptoms and to check for their presence (Fann 1976; Eisdorfer 1975; *Medical Letter on Drugs and Therapeutics* 1975). Elderly patients on these drugs over long periods of time should be examined regularly, especially the tongue area because this is usually the first sign of dyskinetic movement.

It should be noted that the combining of various phenothiazines, such as the more potent piperazine derivatives with one of the aliphatics, has shown no convincing evidence of increased efficacy or lowered side effects. However, total dosage may be reduced in this manner. Certain other combinations of phenothiazines are contraindicated and may actually cancel therapeutic effects. When phenobarbital is administered with a phenothiazine, it acts to accelerate its metabolism, resulting in a lowered serum level of the phenothiazine and a lessening of its clinical effect. Phenothiazines administered with tricyclic antidepressants tend to bring about increased blood levels of both these agents. Although anticholinergic complications are increased by this combination, there is a possibility that their combined antagonistic dopaminergic properties act to reduce extrapyramidal symptoms. Phenothiazines act in the same way as tricyclic antidepressants to block the action of certain antihypertensive agents (Fann 1973; Salzman et al. 1975).

Finally, it should be mentioned that long-acting injectable forms of fluphenazine, either the enanthate or decanoate ester, are currently available in the United States. Fluphenazine is one of the piperazines. Their advantage is that they need to be administered only once every 3 or 4 weeks so that, when necessary, there can be greater control over medication intake. This could be beneficial in the management of elderly outpatients who live alone. Their dosage level should be about half that administered to younger patients. Drugs given in this manner are able to exert an antipsychotic effect at lower dosage levels over equivalent periods of time. Their overall efficacy, however, is still open to debate. A high incidence of dystonic and depressant side effects has been reported along with a high incidence of extrapyramidal reactions with the enanthete form (Arie 1973; Prien and Caffey 1974).

SUMMARY

This paper reviews 1) some of the major physiologic changes attendant upon the aging process, that occur in varying degrees and affect an elderly person's ability to metabolize psychoactive drugs, and 2) the efficacy of psychoactive drug treatment of such emotional disturbances or mental illnesses as anxiety, insomnia, depression, and physiologically based psychosis found among aged persons.

The aging process produces physiologic alterations that affect the absorption, transport, tissue localization, metabolism, and excretion of drugs. There appear to be wide variations in the extent of these changes among the elderly; they vary according to the number and severity of chronic diseases and pathological processes present in the specific individual. The central nervous system is the most sensitive organ in terms of age-related response to psychoactive drugs. Changes in the various aging body systems that alter the central nervous system, the arterial and venous flow, blood components, renal flow, functional tissue, and homeostatic capability have significant effect on the ability of the elderly to metabolize and eliminate psychoactive drugs. Accurate diagnosis and prescribing require that the patient's drug history and biologic and chronologic age be taken into account.

In drug treatment of anxiety in the elderly, the benzodiazepine derivatives (minor tranquilizers)--although not ideal agents--are considered the most effective of currently available anxiety-reducing agents. Depending on dosage level, the hypnotics are interchangeable to a large degree with the anxiolytics. Barbiturates are a poor choice as anxiolytics, and antihistamines are inadvisable.

In the treatment of insomnia, the use of the benzodiazepine derivatives (oxazepam and flurazepam), barbiturates, the piperidinedione hypnotics, and the quinazalone derivatives (methaqualone and chlorohydrate) were reviewed. Particular caution in relation to barbiturates, the piperidinedione hypnotics, and methaqualone was indicated, due to their REM depression characteristics, addictive potential, and tendency to accelerate liver microsomal metabolism.

Depression in the aged has characteristics common to that occurring in younger persons, and its treatment with antidepressant drugs is similar. However, diagnosis of depression in elderly patients requires special care, since many symptoms of depression are also characteristic of senility or the general difficulties of old age. The efficacy, actions, and side effects of the tricyclic antidepressants, monoamine oxidase (MAO inhibitors), lithium carbonate, and stimulants are reviewed. In general, it is recommended that dosages begin at lower levels and increase at a more gradual rate for the elderly than for younger persons, in order to prevent undesirable side effects.

Drug treatment of physiologically based psychosis, such as organic brain syndrome, and some schizophrenias, in the elderly is similar to that of younger persons, with the exception of dosage levels. Recommended beginning dosage levels of antipsychotic agents are one-half to two-thirds that of younger persons. The phenothiazine derivatives are the most commonly used agents and have the ability to have a calming effect, without severely impairing motor function or making patients sleepy. Nevertheless numerous side effects accompany their use. The long-acting piperazine, fluphenazine, has the advantage of requiring administration only once every 3 or 4 weeks, thus allowing greater control over the medication. Its overall efficacy remains in doubt however.

The use of psychoactive drugs in the treatment of emotional disturbance and mental illness in the elderly requires accurate diagnosis and both physician and patient awareness of the necessity to titrate dosages and the duration of administration according to the person's biologic and chronologic needs.

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22

PATTERNS OF PSYCHOACTIVE DRUG USE AMONG THE ELDERLY

Robert Prentice

INTRODUCTION

In 1970, people 65 years of age and over represented about 10 percent of the total U.S. population, and that figure is expected to climb to over 11 percent in the year 2000. By way of contrast, people 65 and over constituted only about 4 percent of the population in 1900 (American Health Care Association 1975). A large share of that increase can be attributed to improved health care in the earlier years, enabling more people to live into old age.

Older people as a group, however, still suffer from a highly disproportionate share of chronic illnesses (Manard 1975) and, largely as a result, they receive more medications than other age groups. While people 65 and over represent 10 percent of the total population, they receive over 25 percent of all prescriptions written (U.S. Senate Special Committee on Aging 1973).

An increasing share of all prescriptions is accounted for by psychoactive drugs, especially since the introduction of tranquilizers in the mid-1950s. In 1970, 214 million prescriptions for major and minor tranquilizers, antidepressants, stimulants, sedatives, and hypnotics were filled in American drugstores, representing 17 percent of all prescriptions filled (Parry et al. 1973). Nearly a third of the adult population indicated that they had used at least one prescription or over-the-counter psychoactive drug in a 1-year period (Parry et al. 1973).

As yet, there have been very few systematic attempts to explore the extent to which older people use psychoactive drugs. In 1967, a DHEW Task Force on Prescription Drugs assembled a Master Drug List, ranking the prescription drugs used most frequently by persons 65 years of age and over. Of the 21 most widely used drugs, 8 were psychoactive drugs (DHEW 1968). That study was conducted 10 years ago, and little work of a comparable nature has been done since then. Both the absence of data and the need for additional research were cited in the report of the Conference on Drug Use and the Elderly (1975), sponsored by the National Institute on Drug Abuse and the National Institute for Drug Programs. Against that background, then, it is the purpose of this paper to draw together the currently available data on patterns of psychoactive drug use among the elderly as an initial effort in what is hoped will be an ongoing research direction.

It is important to make clear at the outset that the discussion of psychoactive drug use patterns among the elderly is based solely on data from surveys and case studies. Prevalence rates for particular drugs are not assessed in relation to the advisability of using those drugs for specific conditions experienced by elderly patients. The presentation and discussion of data should therefore be taken only as an attempt to profile the extent to which older people use psychoactive drugs. Whether or not that drug use is appropriate, even in cases where prevalence rates are comparatively high, is contingent upon more detailed analyses of the relationship between drug use, diagnoses, and the physiological and social characteristics of aged persons.

It is also important to specify the types of drugs being considered in this report. Although the term "psychoactive" may refer to both licit and illicit drugs, it was determined that illicit drugs are beyond the scope of this paper. Accordingly, throughout the remainder of the discussion, the term psychoactive drugs is taken to be synonymous with legally prescribed or legally purchased over-the-counter psychoactive drugs. As a general guide to the drugs being considered, a classification system, taken from Parry et al. (1973) is provided in table 1.

There are some difficulties in the task at hand. Few studies have attempted to measure the nature and extent of psychoactive drug use among the elderly. Among the studies that do exist, the data are often not directly comparable. There is variation, for example, in the classification of psychoactive drugs. In one study, sedatives are combined with minor tranquilizers, in another they are grouped with hypnotics, and in another they are treated as a separate class. There are also discrepancies between studies in terms of what constitutes the "older population." Among the studies cited in this report, the oldest age categories represented range from "50 and over" to "65 and over."

There are also differences in terms of methodological strategies pursued and data sources utilized. In the case of prescription psychoactive drugs, for example, some studies use prescription orders based on physicians' records, some focus exclusively on drugs actually administered, and others are concerned with reported use based on direct interviews. In an ideal situation, the different data sources could be considered as merely separate components in a comprehensive data base, from which fruitful comparisons could be made. However, the general paucity of studies frustrates that potential and makes comparisons extremely difficult.

Given the variations among studies, and the lack of information in general, it is very difficult to present the data in a synthetic and comparative fashion; accordingly, the style of presentation will tend to rely on serial discussions of individual studies, with integrating comments when appropriate.

The following section focuses on prescription psychoactive drugs. Data on patterns of use among the elderly are presented in two parts: The first part summarizes studies on psychoactive drug use in the general elderly population; the second part reviews studies conducted among institutionalized populations. Following the presentation of data on patterns of prescription psychoactive drug use, there is a review of studies on noncompliance, improper prescribing, and drug-related illness and death.

The next section focuses on over-the-counter (OTC) psychoactive drugs. Data are presented on the extent of OTC psychoactive drug use among the elderly.

The final section summarizes the findings cited in this report. In addition, suggestions are made for future directions of research efforts.

PRESCRIPTION PSYCHOACTIVE DRUGS

Psychoactive drugs are prescribed for a variety of reasons, not all of which are directly related to diagnoses for psychiatric illnesses. Balter and Levine (1969) have indicated that most psychoactive drugs are prescribed by general practitioners and internists, and only a third of all prescriptions for antidepressants and major tranquilizers--usually prescribed for psychiatric disorders--are written by psychiatrist and neurologists. Parry et al. (1973) found that 85 percent of the people in their survey who reported use of a prescription psychoactive drug had never seen a psychiatrist. Psychoactive drugs are also prescribed in a variety of contexts, including doctors' offices, outpatient clinics, general hospitals, nursing homes, and psychiatric wards.

The apparent far-reaching use of prescription psychoactive drugs raises several issues that need to be examined. A prerequisite for any further discussion, of course, is a basic knowledge of the extent to which people use particular drugs, in what contexts, and for what purposes. It is also important to know whether people use those drugs properly and, if not, why misuse occurs. "Misuse" here refers to inappropriate use of prescription psychoactive drugs, resulting either from the patient's failure to comply with proper directions for the use of a medication or from improper prescribing on the part of a physician. If misuse does occur, it is important to know how widespread it is, what the reasons for it are, and whether it involves harmful consequences.

The discussion of prescription psychoactive drug use among the elderly that follows is presented with those issues in mind. However, the paucity of available data makes it very difficult to address those issues directly. Accordingly, the purpose of this section is to provide relevant information to the extent possible, and to point out the limitations of the data in relation to the issues under

TABLE 1.—Classification of psychoactive drugs

Type of Class	Examples: Generic Names	Examples: Trade Names
Prescription Drugs		
Major tranquilizers		
Phenothiazine derivatives	Chlorpromazine, thioridazine	Thorazine, Mellaril
Butyrophenones	Haloperidol	Haldol
Thioxanthenes	Thiothixene, chlorprothixene	Navane, Taractan
Minor tranquilizers		
Substituted diols	Meprobamate, tybamate	Equanil, Miltown, Tybatran
Benzodiazepines	Chlordiazepoxide, diazepam, oxazepam	Librium, Valium, Serax
Miscellaneous	Hydroxyzine, buclizine	Atarax, Softran
Antidepressants		
Tricyclics	Imipramine, amitriptyline	Tofranil, Elavil
Monoamine oxidase inhibitors	Isocarboxazid, phenelzine	Marplan, Nardil
Other	Methylphenidate, combination of amitriptyline and perphenazine	Ritalin, Triavil, Etrafon
Stimulants		
Amphetamines	Detroamphetamine (and combinations), methamphetamine	Dexedrine, Dexamyl, Desoxyn
Others	Deanol, pentylenetetrazol (and combinations)	Deaner, Metrazol
Sedatives		
Barbiturates (long-acting and intermediate-acting)	Phenobarbital, butabarbital	Eskabarb, Butisol
Others	Bromisovalum	Bromural
Hypnotics		
Barbiturates (short-acting)	Secobarbital, pentobarbital	Seconal, Nembutal
Others	Glutethimide, ethchlorvynol	Doriden, Placidyl
Over the Counter		
Stimulants	Caffeine	No-Doz, Vivarin, No-Nod
Tranquilizers	Scopolamine and/or methapyrilene	Cope, Compoz
Sleeping pills	Scopolamine and/or methapyrilene	Sleep-Eze, Mr. Sleep, Sominex, Nytol

consideration. Some suggestions for further research are offered in the final section.

PATTERNS OF PSYCHOACTIVE DRUG USE AMONG THE ELDERLY

The studies to be discussed presently are grouped into two general types. The first group consists of studies that address patterns of prescription psychoactive drug use in the general elderly population. The second group focuses specifically on the elderly residing in institutional settings.

General Population

One of the best available data sources on prescription drugs is the National Disease and Therapeutic Index (NDTI 1975a,b). Prescription data from the NDTI are based on a survey of U.S. physicians who are asked to fill out forms on a quarterly basis, detailing drug orders for patients during a 48-hour period. The NDTI, unfortunately, is a private data source, available on a subscription basis only; accordingly, permission must be received before data can be published.

While the NDTI is a comprehensive data source, time and cost factors have restricted this analysis to a presentation of data on the proportion of selected prescription psychoactive drug orders issued to the elderly. Table 2 summarizes the findings. It is important to emphasize here that the number represents appearances, and not prescriptions or people. Appearances are the number of times a particular drug is recorded in the NDTI survey; it is a broader category than prescriptions, since it also includes hospital orders, physician samples, direct dispensing, nursing home orders, etc. Appearances also differ from the number of people receiving drug orders, since some people may receive more than one order.

If it is kept in mind that people 65 years of age and over constitute 10 percent of the total U.S. population, it can be seen that, with the exception of the stimulants and Stelazine (a major tranquilizer) older people receive a highly disproportionate number of orders for the prescription psychoactive drugs sampled. In fact, again with the exception of the stimulants and Stelazine, older people receive at least one-fifth of all orders for the sampled drugs; in the case of Thorazine (a major tranquilizer), the sedatives, the nonbarbiturate hypnotics, and three out of four of the barbiturate hypnotics, older people receive over one-fourth of all drug orders. While data on Mellaril (another major tranquilizer) are not presented, evidence (cited elsewhere in this monograph) suggests that use patterns in respect to age do not differ substantially from Thorazine, and, in fact, Mellaril may even be used more extensively by older people.

Of the most widely used individual prescription psychoactive drugs sampled, older people receive 21.2 percent of all orders for Valium (minor tranquilizer), 23.4 percent of all orders for Librium (minor tranquilizer), 30.4 percent of all orders for Dalmane (nonbarbiturate hypnotic), 21.1 percent of all orders for Elavil (antidepressant), and 27.1 percent of all orders for phenobarbital (sedative). Older people receive the most highly disproportionate percentage of drug orders for Butisol Sodium (sedative), for which nearly half of all orders are issued to people 65 and over, and Doriden, Placidyl, and Amytal (hypnotics), for which approximately a third of all orders are issued to people 65 and over.

It is also apparent from the data presented that, for the drugs sampled, it is not uncommon for women to receive two out of every three drug orders issued. That general pattern appears to hold true among people 65 and over as well, with a few exceptions. The gap closes substantially when looking at barbiturate hypnotics, and in the case of Tuinal, older men actually receive more drug orders than older women. In the case of Elavil, an antidepressant, all women receive a little more than three out of every four drug orders, but older women receive a more highly disproportionate number in comparison to older men. The analysis takes into account the fact that women constitute a greater proportion of the population 65 years of age and over than they do in the population as a whole.

Approaching the issue of psychoactive drug use patterns from another direction, Parry et al. (1973) interviewed a national household sample of 2,552 persons, ranging in age from 18 to 74. The interviews, conducted in late 1970 and early 1971, consisted of a series of questions related to the respondents' drug use during a 1-year period preceding the interview. A validity study conducted prior to the national survey indicated that the results may tend to underestimate prevalence rates by a few percentage points.

It is important to point out two features of the survey that restrict its scope when considered in the present context. First, since the sample was based on adults in households, it does not include those who were residing in institutions at the time of the survey; thus, the data should be regarded as reflecting only psychoactive drug use patterns in the noninstitutionalized population. Second, no

TABLE 2.—Number and percentage of appearances of selected prescription psychoactive drugs by age group and sex, NDTI, 1975 (Number in thousands)

	All Ages						65 Years and Over					
	Male		Female		Total		Male		Female		Total	
Drug Class and Name	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Major tranquilizers												
Thorazine	1,714	38.9	2,688	61.1	4,402	100	384	3.7	777	17.7	1,161	26.4
Stelazine	880	35.3	1,611	64.7	2,491	100	92	3.7	196	7.9	288	11.6
Minor tranquilizers												
Valium	10,959	35.7	19,729	64.3	30,688	100	2,229	7.3	4,267	13.9	6,496	21.2
Librium	2,464	36.0	4,378	64.0	6,842	100	538	7.9	1,060	15.5	1,598	23.4
Antidepressants												
Elavil	1,514	22.2	5,319	77.8	6,833	100	246	3.6	1,197	17.5	1,443	21.1
Tofranil	1,151	32.6	2,383	67.4	3,533	100	195	5.5	498	14.1	693	19.6
Stimulants												
Biphetamine	121	17.0	590	83.0	711	100	N.A.	N.A.	8	1.1	N.A.	N.A.
Dexedrine	225	48.2	274	51.8	529	100	18	3.4	7	1.3	25	4.7
Sedatives												
Phenobarbital	2,163	40.2	3,222	59.8	5,285	100	456	8.5	1,004	18.6	1,460	27.1
Butisol sodium	343	27.4	910	72.6	1,253	100	141	11.3	411	32.8	552	44.1
Barbiturate hypnotics												
Seconal	1,139	35.5	2,072	64.5	3,211	100	318	9.9	381	11.9	669	21.8
Nembutal	848	33.4	1,690	66.6	2,538	100	268	10.6	473	18.6	741	29.2
Tuinal	451	40.6	661	59.4	1,112	100	153	13.8	143	12.9	296	26.7
Amytal	159	32.6	329	67.4	488	100	66	13.5	92	18.9	158	32.4
Nonbarbiturate hypnotics												
Dalmane	3,303	36.7	5,698	63.3	9,001	100	937	10.4	1,802	20.0	2,739	30.4
Placidyl	494	35.3	906	64.7	1,400	100	130	9.3	333	23.8	463	3.1
Doriden	431	41.8	600	58.2	1,031	100	156	15.1	210	20.4	366	35.5
Quaalude	171	48.6	181	51.4	352	100	46	13.1	50	14.2	96	27.3

How to read the table: In 1975, Thorazine (a major tranquilizer) appeared in the NDTI a total of 4,402 times; 1,714 (38.9 percent) of those drug orders were issued to males, and 2,688 (61.1 percent) were issued to females. A total of 1,161 of those orders for Thorazine were issued to people over 65 years of age and over, constituting 26.4 percent of all appearances; 384 (8.7 percent of all appearances) were issued to older men, and 777 (17.9 percent of all appearances) were issued to older women.

persons 75 years of age or older were interviewed, thereby excluding over one-quarter of the population 60 and over.

As can be seen from table 3, roughly one-fifth (21 percent) of older men and one-third (32 percent) of older women indicated that they had used at least one prescription psychoactive drug in the last year. For older men, the prevalence of use was substantially higher than that of men in the other age groups; a similarly disproportionate percentage for older women would be evident if stimulants were excluded from consideration.

Minor tranquilizers/sedatives and hypnotics are the drugs of use most frequently cited by both older men and older women. Substantially more older women (25 percent) than older men (11 percent), however, indicated use of minor tranquilizers/sedatives. For both older men and older women, the use of minor tranquilizers/sedatives and hypnotics is more prevalent than in any other age group.

In addition to measuring prevalence rates, the survey attempted to determine levels of use of prescription psychoactive drugs. Table 4 distinguishes between "use" and "high level of use," by age group. "High level of use" is defined as a maximum pattern which involves regular daily use for at least 2 months.

While the reported data do not reveal level of use by specific class of drug, it can be seen that, for all prescription psychoactive drugs taken together, 9 percent of all those in the age group 60-74, or roughly one-third (32 percent) of those who had used a drug during the past year, indicated a high level of use. When comparing those figures with the 30-44 and 45-59 age groups, it appears that, while a larger percentage of older people may be using prescription psychoactive drugs, they are less likely to be using them at a high level.

The survey by Parry et al. (1973) also attempted to relate other demographic factors--geographic region, Index of Social Position (ISP), and education--to prevalence rate and level of use of prescription psychoactive drugs; unfortunately, the reported data did not correlate those factors with age. Among all persons in the survey, however, those living in the western States tended to show a somewhat higher prevalence rate, and they tended more often to use drugs at a high level. ISP (based on the standard Hollingshead scoring) and education appeared to have little effect on prevalence rates; however, those persons with lower ISP and education ratings showed some tendency to use drugs at a high level more often. It cannot be discerned from the reported data whether, or to what extent, those tendencies hold true for the age group 60-74.

Abelson and Atkinson (1975) provide some additional data which give an indication of the extent to which recent use of prescription psychoactive drugs is also the first use (table 5). Their study was based on interviews with a national household sample of 3,071 adults and 952 youths, conducted between November 1974 and March 1975. It should be pointed out that the primary focus of the study was on illicit drug use, a phenomenon associated predominantly with younger age groups; accordingly, data on prescription drug use among older people (defined broadly as "50 and over") was a peripheral aspect of the study.

The data suggest that those in the age group 50 and over (as compared with adults of all ages) are more likely to have reported use of a sedative within the past year and less likely to have reported use of a stimulant, while reported use of tranquilizers (major and minor combined) is roughly the same between the two groups. Particularly interesting, however, is the indication that, for both groups, approximately two-thirds of those who used sedatives and one-half of those who used tranquilizers within the past year did so for the first time.

Guttman (1977) specified some characteristics of elderly users of prescription drugs. In a Washington, D.C., household sample of 447 persons aged 65 and over, with an average age of 71.9 years and a male/female ratio of 59.6 percent to 40.4 percent, he found that 13.6 percent of the respondents in the survey used sedatives/tranquilizers daily, and 1.1 percent indicated daily use of antidepressants. Roughly half (50.7 percent) of those who used psychoactive drugs on a daily basis reported that they could not perform their regular daily activities without their medication; 28.6 percent indicated that their health was the main reason for using psychoactive drugs; and 38.6 percent reported taking several kinds of drugs in combination. He also found that, with a statistically significant difference, users of prescription psychoactive drugs tended to be younger and native born, while nonusers tended to be older and foreign born.

In summary, it appears that the elderly receive a disproportionately high number of orders for the tranquilizers, sedatives, hypnotics, and antidepressants sampled from the NDTI, while the number of stimulants ordered for the elderly appears to be proportionately low. The hypnotics and sedatives appear to

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TABLE 3.—Use of prescription psychoactive drugs during past year by drug class and by sex and age

	Percentage Using in Past Year Among Age Groups				
Drug Class and Sex	18-29	30-44	45-59	60-74	All Ages
Major tranquilizer					
Men	*	1	1	*	1
Women	1	2	2	2	2
Minor tranquilizer/sedative					
Men	5	7	9	11	8
Women	12	21	22	25	20
Antidepressant					
Men	+	2	1	4	2
Women	2	2	2	2	2
Stimulant					
Men	1	2	2	1	2
Women	10	11	6	3	8
Hypnotic					
Men	1	1	2	7	3
Women	3	3	4	8	4
All psychoactive drugs					
Used any during past year					
Men	6	12	14	21	13
Women	23	32	31	32	29

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*Less than 0.5 percent
+No cases
Past year refers to 1969-1970

SOURCE: Parry et al. (1973)

TABLE 4.—Users in past year (1969-1970) and high-level users of prescription psychoactive drugs by age group

	Among All Persons in Each Age Group		Among Users in Each Age Group
Age Group	Percent Using	Percent Using at High Level	Percent Using at High Level
18-29	15	5	31
30-44	24	10	39
45-59	23	10	42
60-74	27	9	32

TABLE 5.—Medical experience with prescription psychoactive drugs during 1974 (percent)

	Any	Sedatives	Tranquilizers	Stimulants
50 years and over				
Used in past year	*	15	14	1
First used in past year	15	10	7	1
All adults 18 years and over				
Used in past year	*	10	15	3
First used in past year	15	7	8	2

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*Not available

SOURCE: Abelson and Atkinson (1975)

be the classes of psychoactive drugs most disproportionately issued to the elderly. Women in general are more likely than men to receive orders for psychoactive drugs, and that pattern tends to hold true for the older population.

In terms of the percentages of the older population who use prescription psychoactive drugs, approximately one-fifth of older men and one-third of older women reported use of at least one drug during a 1-year period. The highest prevalence of use occurred in the combined classes minor tranquilizers/sedatives (11 percent of older men and 25 percent of older women), followed by hynotics, (7 percent of older men and 8 percent of older women); comparatively lower prevalence rates were reported for stimulants, major tranquilizers, and antidepressants. A greater proportion of both older men and women reported use of minor tranquilizers/sedatives and hypnotics than did those in other age groups.

Among the elderly who use prescription psychoactive drugs, one-third reported a high level of use (regular daily use for at least 2 months). Two-thirds of those who reported use of sedatives and one-half of those who reported use of tranquilizers in a 1-year period indicated that it was their first use of those drugs (age group 50 and over).

Institutionalized Populations

Although the functions of psychoactive drug use among the elderly residing in institutions and those in the general population may differ substantially, it is nevertheless desirable to include use data for the institutionalized elderly in order to provide a more comprehensive profile of psychoactive drug use in various contexts. Unfortunately, it is necessary, at the present time, to rely on data from individual case studies. Even those studies are sparse, and useful data were found only in relation to nursing home residents and psychiatric inpatients; accordingly, the data presented on patterns of prescription psychoactive drug use among institutionalized elderly populations are limited in both scope and generalizability. The data are too scanty to be regarded as anything but preliminary indications of use patterns; they should not be regarded as representative.

Nursing home residents. In 1970, nearly three-quarters (72.4 percent) of the older population living in institutions were in nursing homes and related facilities (Manard 1975). It has been estimated that slightly more than 5 percent of the population 65 years of age and over are in nursing homes or related facilities on any given day, and that approximately 20 percent of the older persons can expect to spend some time in nursing homes during their lifetime (U.S. Senate Special Committee on Aging 1975). The nature and extent of psychoactive drug use within nursing homes, then, can affect a potentially significant segment of the older population.

In terms of the psychoactive drugs most frequently prescribed in nursing homes, some preliminary data are provided in a General Accounting Office audit of Medicaid payments for prescription drugs in nursing homes in Illinois, New Jersey, and Ohio (U.S. Senate Special Committee on Aging 1973). The audit, commissioned by the Subcommittee on Long-Term Care of the U.S. Senate Special Committee on Aging, covers the periods of January, April, July, and October of 1970. Table 6 presents the GAO data on prescribing

TABLE 6.—The 10 drugs most prescribed in nursing homes in three States in 1970, by number of prescriptions paid for by Medicaid

Rank	Drug Name and Class	Number of Prescriptions	Percent of All Prescriptions
1	Thorazine (major tranquilizer)	23,126	3.5
2	Darvon compound (analgesic)	21,436	3.2
3	Mellaril (major tranquilizer)	17,977	2.7
4	Phenobarbital (sedative)	9,663	1.4
5	Chloral hydrate (hypnotic)	8,264	1.2
6	Doriden (sedative)	7,802	1.1
7	Librium (minor tranquilizer)	7,259	1.1
8	Aspirin and Bufferin (analgesics)	6,875	1.0
9	Nembutal (hypnotic)	6,133	0.9
10	Valium (minor tranquilizers)	5,308	0.8

NOTES: Total number of prescriptions was 657,882.
Sample covers January, April, July, and October of 1970 in the States of Illinois, New Jersey, and Ohio.
Drug classes used here conform with categories used elsewhere in this monograph rather than those in the original.

SOURCE: U.S. Senate Special Committe on Aging (1973, p. 247).

patterns among the elderly poor in nursing homes.

Of the 10 most frequently prescribed individual drugs in the GAO audit, 8 were psychoactive drugs. The first and third most frequently prescribed drugs--and the two most frequently prescribed psychoactive drugs--were Thorazine and Mellaril (both major tranquilizers) which, taken together, accounted for 7 percent of the total number of prescriptions.[1] The sedatives phenobarbital and Doriden ranked 4th and 6th, the hypnotics chloral hydrate and Nembutal ranked 5th and 9th, and the minor tranquilizers Librium and Valium ranked 7th and 10th.

The most notable deviation from the NDTI data in table 2 on drug orders for the older population taken as a whole is the proportionately higher number of prescriptions for major tranquilizers in nursing homes. That observation is supported by the NDTI data supplement, "Leading Drugs Used in Nursing Homes" (NDTI 1975), which shows that, from July 1974 through July 1975, tranquilizers (both major and minor) were the most frequently ordered drug class in nursing homes, with Mellaril and Thorazine, respectively, being the most frequently ordered tranquilizers. In terms of the percentage of older people residing in nursing homes who receive prescriptions for psychoactive drugs, there are a few studies which report relevant data. Ingman et al. (1975) conducted a study of the patterns of prescribing and administering of drugs among the elderly in a long-term care institution in Connecticut. Drug orders for 2 different dates 10 months apart were recorded for each of 131 patients (ages not given) residing in 3 areas of the 300-bed facility. These included an area primarily for severely brain-damaged persons; an area for ambulatory and more self-sufficient residents; and an extended care unit for the maximally disabled and patients recently discharged from hospitals.

Table 7 summarizes their data on the number and percentage of patients with prescriptions for psychoactive drugs. Over one-third (34.4 percent) of the patients had prescriptions

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[1] The figure cited here differs from that discussed in the text of the subcommittee report. The subcommittee chose to focus on percentages calculated from total drug costs, which distorts actual prescription patterns by injecting the added factor of variable costs between different drugs. Percentages and ranks discussed here are based on the actual numbers of prescriptions.

TABLE 7.—Number and percentage of 131 nursing home patients with prescriptions for psychoactive drugs, by drug class

Drug Class	Patients with Prescriptions for One Drug	Two Drugs	Three Drugs	Totals
Major tranquilizers				
Number	39	5	1	45
Percent	29.8	3.8	0.8	34.4
Minor tranquilizers				
Number	25	1	0	26
Percent	19.1	0.8	0	19.9
Antidepressants				
Number	13	1	0	14
Percent	9.9	0.8	0	10.7
Hypnotics				
Number	30	2	1	33
Percent	22.9	1.5	0.8	25.2

SOURCE: Ingman et al. (1975)

for major tranquilizers, one-quarter (25.2 percent) had prescriptions for hypnotics, one-fifth (19.9 percent) had prescription for minor tranquilizers, and one-tenth (10.7 percent) had prescriptions for antidepressants. More patients (4.6 percent) had prescriptions for two or three major tranquilizers than for any other class of psychoactive drug.

Beardsley et al. (1975) conducted a study of drug use among 270 patients (ages not given) in five nursing homes in the Greater Minneapolis-St. Paul area. The nursing homes were selected to represent different geographic locations, sizes, and types of ownership. Data on drug use were collected by two pharmacists who used patients' charts, medication records, and nursing Kardex files. Cases of drug use were recorded only if a drug had been ordered by a physician and had been administered within the month prior to the review.

Among the 1,109 cases of drug use recorded (an average of 4.1 per patient), psychoactive drugs comprised 20.1 percent of the total. As can be seen from table 8, the psychoactive drug classes represented were sedative/hypnotics (9.1 percent), major tranquilizers (5.4 percent), minor tranquilizers (3.6 percent), and antidepressants (2.0 percent). Roughly a third of the patients were receiving sedative/hypnotics and tranquilizers, while about 8 percent were receiving antidepressants.

Beardsley et al. (1975) also reported data on the most frequently used individual drugs within each drug class. As can be seen from table 9, chloral hydrate was the most frequently prescribed hypnotic, issued to 12.2 percent of the patient population. Mellaril was the most frequently prescribed major tranquilizer, issued to 11.1 percent of the patient population. Valium was the most frequently prescribed minor tranquilizer, issued to 9.3 percent of the population. Tofranil was the most frequently prescribed antidepressant, issued to 2.2 percent of the patient population.

Published data on polypharmacy in nursing homes are scarce. Ingman et al. (1975) found that 4.6 percent of the nursing home residents in their study were simultaneously receiving more than one major tranquilizer, 2.3 percent were receiving more than one hypnotic, and fewer than 1 percent were receiving more than one minor tranquilizer or antidepressant. Beardsley et al. (1975) did not report polypharmacy data specific to psychoactive drugs, but for all drugs there was an average of 4.1 per patient, with a range from 0 to 15 per patient. They found the average number of drugs per patient to vary in relation to payment mechanism, with Medicare recipients receiving 3.5 drugs, Medicaid recipients receiving 4.2, and patients with private third party payments receiving 5.5. They also found some variation between nursing homes, ranging from a low average of 2.8 per patient to a high average of 4.5. It is not clear,

TABLE 8.—Number and percentage of psychoactive drugs prescribed in nursing homes, by class of drug

Drug Class	Number of Cases of Drug Use	Percent of Total Cases	Percent of Those Receiving Psychoactive Drugs
Major tranquilizers	60	5.4	22.2
Minor tranquilizers	40	3.6	14.8
Antidepressants	22	2.0	8.1
Hypnotics	101	9.1	37.4
TOTAL	223	20.1	

NOTES: Number of cases of drug use during the month prior to review was 1,109.

Because of polypharmacy, i.e., some patients receive more than one drug in a class, the figures in this column are approximations. However, these are good approximations because the number of patients who use more than one drug in a class is very small.

SOURCE: Adapted from Beardsley et al. (1975).

TABLE 9.—Individual psychoactive drugs most frequently prescribed in five nursing homes, by class of drug

Drug Class	Drug Name	Number of Cases of Drug Use	Percent of Patients Who Receive Drug
Major tranquilizer	Mellaril	30	11.1
Minor tranquilizer	Valium	25	9.3
Antidepressant	Tofranil	6	2.2
Hypnotic	Chloral hydrate	33	12.2

NOTES: The number of drug cases recorded is not the number of patients, as some patients received more than one drug.

SOURCE: Beardsley et al. (1975)

however, to what extent those patterns may hold true for psychoactive drugs.

It is difficult to make direct comparisons between the data of Ingman et al. (1975) and Beardsley et al. (1975). It is not clear, for example, to what extent their classification systems overlap. Beardsley et al. combined sedatives and hypnotics into one class, while Ingman et al. did not specify which class includes sedatives. Another difference surrounds the question of what constitutes a "drug case." Beardsley et al. recorded only those cases where drugs were actually administered, while Ingman et al. recorded drugs prescribed. As Ingman et al. pointed out, 53 percent of all "neuroactive" drugs in their study (psychoactive drugs plus analgesics, skeletal muscle relaxants, antiparkinson drugs, and autonomic agents) were issued p.r.n. (pro re nata, or according to need) so there was substantial nurse discretion in administration; of the average 2.1 neuroactive drugs per patient prescribed, an average of 1.3 drugs was actually administered.

Those differences notwithstanding, it appears that major tranquilizers and hypnotics are the classes of psychoactive drugs most frequently prescribed in the nursing homes

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sampled. (Those findings are generally compatible with the GAO study cited earlier). The data of Beardsley et al. on drugs actually administered indicated that over one-third of the nursing home residents in their sample received hypnotics (and sedatives), and over one-fifth received major tranquilizers. The data of Ingman et al. on drugs prescribed, which may overestimate actual use because of p.r.n. orders, indicate that over one-third of nursing home residents in their sample were issued prescriptions for major tranquilizers, while one-quarter received prescriptions for hypnotics.

Psychiatric inpatients. Perhaps the most comprehensive reporting of data on elderly psychiatric patients is that derived from a survey of psychoactive drugs used in 12 Veterans Administration hospitals, conducted in February 1974 by Robert Prien and colleagues (Prien et al. 1976; Prien et al. 1975; Prien 1975). The survey was based on a sample of 2,682 patients 60 years of age and over, with 1,276 (48 percent) having a primary diagnosis of mental disorder, 197 (7 percent) having an associated diagnosis of mental disorder, and 1,209 (45 percent) having no diagnosis of mental disorder. The sample was predominantly male, with no more than 6 percent female in any diagnostic category. Diagnostic categories were obtained from patients' medical records. Drug information was derived from patients' medication orders, and included all drugs administered on the day of the survey.

Of all patients 37 percent received at least one major tranquilizer, minor tranquilizer, or antidepressant. The proportion of psychiatric patients who received at least one drug (56 percent) was substantially higher than that of the nonpsychiatric patients (16 percent). The patterns of use also differed between the two groups. Among the psychiatric patients, major tranquilizers accounted for 69 percent of all psychoactive drug orders, with antidepressants accounting for 17 percent and minor tranquilizers accounting for 14 percent. Among the nonpsychiatric patients, minor tranquilizers accounted for 52 percent of all psychoactive drug orders, followed by major tranquilizers (33 percent) and antidepressants (15 percent). Five drugs--thioridazine (Mellaril), chlorpromazine (Thorazine), diazepam (Valium), chlordiazepoxide (Librium), and amitriptyline (Elavil)--accounted for 63 percent of all psychoactive drug orders across diagnostic groups (Prien 1975).

Prien et al. (1975) reported data on the prevalence of psychoactive drug use, by diagnostic category, in the patient population with primary diagnoses of mental disorder. Of those 1,276 patients, 718 were diagnosed as having organic brain syndrome, 362 were diagnosed as schizophrenic, and 196 had other mental disorders. Of schizophrenic patients, 70 percent received psychoactive drugs (the highest percentage), followed by those with other mental disorders (66 percent) and those with organic brain syndrome (55 percent). Table 10 summarizes the data on the proportion of psychiatric patients who received specific psychoactive drugs, by diagnostic category. Of the three drug classes represented, major tranquilizers were used most frequently, with 44 percent of the psychiatric patient population receiving at least one drug in that class. Antidepressants (11 percent) and minor tranquilizers (10 percent) were used less extensively. The highest rate of use of major tranquilizers was among schizophrenic patients (62 percent), while the highest rates of use of antidepressants and minor tranquilizers were among those with other mental disorders (30 percent and 15 percent, respectively). The most widely used major tranquilizers across diagnostic groups were thioridazine and chlorpromazine, which accounted for 61 percent of all orders for major tranquilizers; diazepam accounted for 53 percent of all orders for minor tranquilizers; and amitriptyline accounted for 37 percent of all orders for antidepressants (data not shown).

Laska et al. (1973), in their study of psychoactive drug use among schizophrenic patients in a State hospital, found patterns of use that were generally consistent with those in the survey by Prien et al. (1975). All drug information was taken from the hospital's Drug Monitoring System. Of the 587 schizophrenic patients 65 years of age and over, 70.5 percent were using major tranquilizers, 13.8 percent were using antidepressants, and 8.2 percent were using minor tranquilizers (table 11). The percentage of women who used psychoactive drugs was substantially higher than that of men in all three drug classes.

Prien et al. (1975) also reported data on the proportion and dosage of psychoactive drug use within different age categories of the psychiatric patient population. Table 12 summarizes their findings. Contrary to findings for the general population, it appears that both the percentage of psychiatric inpatients receiving a drug and the mean daily dose of the drug declined as age increased in all three drug classes examined.

Laska et al. (1973) found a similar pattern extended to a wider age range in their study of schizophrenic patients. Among patients over 20 years of age, there was a general tendency for both the percentage of patients

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TABLE 10.—Percentage of psychiatric inpatients receiving psychoactive drugs, by diagnosis

Psychoactive Drugs*	Percentage of Those Diagnosed Who Receive Drug			
	Organic Brain Syndrome (N=718)	Schizophrenia (N=362)	Other Mental Disorders (N=196)	Total (N=1,276)
Major tranquilizers				
Thioridazine	15	20	15	17
Chlorpromazine	9	22	11	13
Trifluoperazine	2	8	4	4
Haloperidol	4	3	2	3
Others	9	17	13	12
Total receiving at least one major tranquilizer	36	62	41	44
Minor tranquilizers				
Diazepam	6	4	8	5
Chlordiazepoxide	3	2	5	3
Others	2	1	2	2
Total receiving at least one minor tranquilizer	10	7	15	10
Antidepressants				
Amitriptyline	3	2	15	4
Doxepin	1	2	6	2
Nortriptyline	2	2	4	2
Others	2	3	7	3
Total receiving at least one antidepressant	8	9	30	11

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*Patients receiving more than one drug are listed under each drug.

SOURCE: Prien et al. (1975)

TABLE 11.—Percent of schizophrenic inpatients 65 years and over who received psychoactive drugs, by drug class

	N	Tranquilizers		Antidepressants
		Major	Minor	
Men	214	57.5	5.1	4.2
Women	373	78.0	9.9	19.3
Total	587	70.5	8.2	13.8

SOURCE: Laska et al. (1973)

TABLE 12.—Use of psychoactive drugs by psychiatric inpatients, by age

	Age of Patient			
Psychoactive Drug Class and Dose	60-65 (N=336)	66-75 (N=328)	Over 75 (N=612)	All Ages (N=1,276)
Major tranquilizers				
Percent of patients who receive drug	54	46	38	44
Mean daily dose (milligrams)[1]	310	255	152	229
Minor tranquilizers				
Percent of patients who receive drug	14	9	8	10
Mean daily dose (milligrams)[2]	45	44	33	40
Antidepressants				
Percent of patients who receive drug	18	13	7	11
Mean daily dose (milligrams)[3]	93	86	74	85

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[1] Converted to equivalent doses of chlorpromazine.

[2] Converted to equivalent doses of chlordiazepoxide.

[3] All doses equivalent.

SOURCE: Prien (1975)

receiving a drug and the average daily dose per drug to decrease as age increased (table 13).

Prien et al. (1976) reported data on polypharmacy patterns in their sample of elderly psychiatric patients in Veterans Administration hospitals. Of the sample of 1,276, 18 percent received two or more psychoactive drugs; 21 percent of those with diagnoses of schizophrenia and other mental disorders and 15 percent of those with diagnoses of organic brain syndrome received multiple drug regimens. The most frequently prescribed combinations were: 1) a major tranquilizer and an antidepressant (23 percent of all polypharmacy prescriptions); 2) two major tranquilizers (21 percent); and 3) a major tranquilizer and a minor tranquilizer or sedative-hypnotic (21 percent). The proportion of patients receiving two or more psychoactive drugs decreased with age: 26 percent of the patients 60-65 years of age received two or more drugs; 20 percent of the patients 66-75 years of age received two or more drugs; and 12 percent of the patients over 75 received two or more drugs. Substantially more females (42 percent) received two or more psychoactive drugs than did males (17 percent), but the sample of females was so small (N=50) as to restrict the validity of generalization.

Fracchia et al. (1971) also reported polypharmacy data for a sample of 569 (137 male, 432 female) psychiatric patients 55 years of age and older in a State hospital. The most frequently prescribed combinations were: 1) a major tranquilizer and an antidepressant-stimulant (35 percent of all polypharmacy prescriptions); 2) a minor tranquilizer and an antidepressant-stimulant (17 percent); 3) a major tranquilizer with a major tranquilizer (16 percent); and 4) a major tranquilizer with a minor tranquilizer (10 percent). There was evidence to indicate that the use of major tranquilizers in combination tended to decrease with advancing age: 60 percent of the patients under the age of 65 received a major tranquilizer as part of a combination, as compared with fewer than 30 percent of those over the age of 75. The use of minor tranquilizers as part of a combination, on the other hand, increased with advancing age.

In summary, among the elderly psychiatric inpatient populations sampled, major tranquilizers were found to be used much more extensively than any other class of psychoactive drugs. Prien found that major tranquilizers accounted for 69 percent of all psychoactive drugs used by psychiatric patients and that 44 percent of the psychiatric patients were using at least one major tranquilizer (Prien 1975; Prien et al. 1975). Patients diagnosed as schizophrenic were most likely to receive major tranquilizers, with roughly two-thirds of schizophrenic patients in two separate studies using at least one drug in that class. Major tranquilizers were also most likely to be used in combination with other psychoactive drugs, most frequently with an antidepressant or another major tranquilizer.

Contrary to patterns found in the general population, use of prescription psychoactive drugs among the psychiatric inpatient populations sampled tended to decline with age. That trend tended to hold true for both the percentage of people using drugs and the average dose per drug, as well as polypharmacy rates.

NONCOMPLIANCE, IMPROPER PRESCRIBING, AND DRUG-RELATED ILLNESS AND DEATH

The data presented thus far have focused exclusively on patterns of prescription psychoactive drug use among the elderly. It is also important, on the other hand, to examine patterns of misuse. Data on two types of misuse--noncompliance and improper prescribing--are presented here, followed by a review of data on drug-related illness and death.

Noncompliance

We were unable to locate any studies that specifically addressed the extent of older people's noncompliance with prescriptions for psychoactive drugs. Other studies of noncompliance shed little light on this issue. What is presented here, then, is a brief review of studies that outline only the broadest parameters of noncompliance.

In a review of noncompliance studies, Hussar (1975) indicates that there has been a wide variation between studies in terms of the degree of noncompliance reported, with most ranging from one-third to one-half of the patients sampled. Steward and Cluff (1972) place the range at 25 percent to 59 percent.

For the most part, efforts to correlate demographic variables with noncompliance have failed to discover any significant relationships (Hussar et al. 1974). In a study of 154 general medical clinic patients, Davis (1968) found that demographic variables had no influence on either attitudinal or behavioral compliance. Boyd et al. (1974) found no significant relationship between noncompliance and sex, race, or education in a sample of 134 outpatients.

A few studies, on the other hand, have found that age has some effect on noncompliance,

TABLE 13.—Percent of schizophrenic inpatients receiving psychoactive drugs and average total daily dose, by age and by sex

Drug Class and Sex	Under 16	16-20	21-40	41-64	65 and Over	All Ages
PERCENT OF PATIENTS RECEIVING DRUGS						
Major tranquilizers						
Male	89.3	96.9	94.7	76.1	57.5	80.5
Female	94.4	91.7	96.9	95.2	78.0	91.4
Male and female	90.6	95.0	95.6	86.0	70.5	85.8
Minor tranquilizers						
Male	5.8	12.3	12.9	8.5	9.2	9.2
Female	8.3	22.2	17.6	11.3	12.3	12.3
Male and female	6.5	15.8	14.8	9.9	8.2	10.7
Antidepressants						
Male	24.3	21.5	14.6	9.1	11.4	11.4
Female	47.2	30.6	21.8	18.1	20.0	20.0
Male and female	30.2	24.8	17.5	13.8	13.8	15.6
AVERAGE TOTAL DAILY DOSE (Milligrams)						
Major tranquilizers (chlorpromazine standard)						
Male	257.8	506.0	544.4	346.5	125.4	388.0
Female	154.9	481.1	725.0	478.3	181.4	459.1
Male and female	230.0	497.8	619.2	422.2	164.8	425.9
Minor tranquilizers (chlordiazepoxide standard)						
Male	21.7	36.3	44.3	30.9	42.6	40.8
Female	25.0	43.4	50.9	37.3	21.9	38.1
Male and female	22.8	39.8	47.6	38.4	26.7	39.2
Antidepressants (all doses equivalent)						
Male	63.6	70.8	104.5	87.1	62.3	87.2
Female	60.3	90.4	102.7	88.0	65.5	84.5
Male and female	62.3	79.4	103.6	87.7	65.2	85.5

SOURCE: Adapted from Laska et al. (1973).

although the results are not consistent. Latiolais and Berry (1969) conducted a study of 180 indigent outpatients at a university hospital; within the sample, 82 patients (45.5 percent) were 50 years of age and over, and 38 patients (21.1 percent) were 60 years of age and over. Of the 77 patients who were misusing their medications, Latiolais and Berry found that 59.8 percent were over 50 years of age and 28.6 percent were over 60 years of age; conversely, of 103 patients who correctly used their medications, 34.9 percent were over 50 years of age and 15.5 percent were over 60 years of age. In Chi-square tests used to determine whether the relationship between age and misuse was statistically significant, they found that, when the sample was divided into "over 50 years of age" and "under 50 years of age," the significance level was 0.1 percent; when the sample was similarly divided at 60 years of age, the significance level was 5 percent. Latiolais and Berry (1969) concluded that older people are more likely to misuse their medications.

Clinite and Kabat (1969), in a study of 30 men recently returned home after hospitalization at a Veterans Administration hospital, found contradictory results. Patients aged 71-80 had a lower rate of medication error (9.6 percent) than any other group; however, patients aged 81-90 had the highest rate (42.9 percent). Those in the age groups 41-50 (42.5 percent) and 51-60 (36.5 percent) had higher error rates than patients in the 61-70 age group (27.6 percent). The relationship between age and noncompliance, then, revealed no clear pattern.

In a study of 178 chronically ill, ambulatory clinic patients over the age of 60, Schwartz et al. (1962) found that 68 percent of those over 75 years of age made medication errors, as opposed to 57 percent of those in the age group 60-74; however, when finer age breakdowns were examined, the relationship between medication errors and increasing age was considerably less straightforward. In general, the studies cited are too inconsistent to make any conclusive statements about the relationship between age and noncompliance.

Hussar (1975) has suggested that, while relationships between noncompliance and demographic variables have not been consistently demonstrated, there are some patient-related factors that contribute to noncompliance. Specifically, he cites as being more likely to be noncompliers, patients with chronic illnesses requiring long-term therapy, patients who live alone, patients with psychiatric illnesses, and patients who receive several drugs requiring frequent administration. The elderly as a group have the highest incidence of chronic illnesses, often live alone (especially women) after the death of a spouse, and receive a disproportionate share of prescription drugs. When it is also considered that patients with psychiatric illnesses may tend to have higher rates of medication errors (Willcox et al. 1965), there is at least a superficial basis for speculating that noncompliance rates among the elderly who receive prescriptions for psychoactive drugs may be comparatively high. As yet, however, there are no studies which verify that speculation.

In a related issue, Doyle and Hamm (1976) have reported data which suggest that tendencies toward self-medication may have some effect on the manner in which older people use prescription drugs. Their study, based on a sample of 405 persons 60 years of age and older residing in three Florida counties, indicated that older people sometimes decide for themselves how they will use their medications, especially in terms of discontinuing medications they do not like and generally determining the duration of medication use. Roughly 40 percent of the respondents indicated that they do not continue to take medications that they dislike; only 43.3 percent of the respondents reported that they took medications until their doctor told them to stop. While 18.8 percent stopped when their prescriptions ran out, 18.3 percent stopped when they felt better, and 3.8 percent stopped when they thought they should. When asked why they kept old prescriptions, a large majority (82.2 percent) did not answer the question; however, 12.8 percent responded that they might need them, and 2.4 percent said they had not thought about throwing them out. A comparatively small, though still significant, percentage of respondents said they did not believe that sharing of prescriptions is harmful (13.3 percent), while 12.6 percent indicated that they had shared, or would consider sharing, their prescriptions.

Improper Prescribing

The issue of improper prescribing of psychoactive drugs is one that deserves careful study--especially in the case of the elderly, who receive a disproportionate share of those drugs. That issue is underscored by an apparent lack of special vigilance on the part of the elderly, as indicated in the study by Doyle and Hamm (1976), who found that 71.6 percent of their sample did not discuss the prescription of one doctor with another doctor, 74.8 percent asked no questions (about content, side effects, or cost) when filling their prescriptions, and only 13.0 percent went to see their doctor to have their medications prescribed, while 30.3 percent simply called

TABLE 14.—Percentage of nonconformance to criteria for psychoactive drug prescriptions in five nursing homes

Drug and Class	Nursing Home A	B	C	D	E
Thioridazine (major tranquilizer)	24.7	18.2	11.2	18.8	16.2
Chlordiazepoxide (minor tranquilizer)	5.0	13.3	5.0	16.0	2.5
Amitriptyline (antidepressant)	4.8	12.5	6.0	6.3	5.4
Chloral hydrate (hypnotic)	1.8	0.4	0.8	0.5	2.1

SOURCE: Adapted from Stewart et al. (1976).

their doctor and 30.5 percent had the pharmacist call the doctor.

Unfortunately, we were able to find only a few studies that dealt with improper prescribing of psychoactive drugs among the elderly, and their emphasis was primarily on psychiatric inpatients and nursing home residents. While they do not necessarily constitute a representative body of data, they do highlight the need for additional research.

A 1971 DHEW study of 75 nursing homes, cited in the report on drugs in nursing homes of the Subcommittee on Long-Term Care of the U.S. Senate Special Committee on Aging (U.S. Senate 1973) provides some background on the context of questionable prescribing and administering of drugs. While much of the information was reported in anecdotal form, some interesting findings were presented: two-thirds of the patients sampled had not been given physical exminations at admission, and of those who did receive physicals, less than one-third covered more than 3 of the 10 body systems; 40 percent of the patients had not been seen by a physician for over 3 months; only 18 percent of the patients had received revised treatment of medication orders within the past 30 days; and 35 percent of the patients receiving tranquilizers had not had their blood pressure recorded in over a year.

Beardsley et al. (1975), in a study of drug use patterns in five nursing homes, attempted to determine whether p.r.n. medications were justified. They analyzed patient charts in order to correlate recorded symptoms with prescribed drugs. They found that 37 percent of tranquilizer p.r.n. orders and 35 percent of hypnotic p.r.n. orders were not justified by the patient charts. While it was not clear to what extent those nonjustifications could be attributed to improper prescribing or to improper recordkeeping, the results at least raise questions as to the appropriateness of the medication orders.

Stewart et al. (1976) attempted to measure the degree of nonconformance to drug use criteria of drugs prescribed in five nursing homes. A single drug was selected to represent a drug class, and standards for proper prescribing were based on a combination of professional expertise and professional literature. Their results for psychoactive drugs, expressed as percent nonconformance, are summarized in table 14. The authors suggested that the low percentage of nonconformance for chloral hydrate most likely reflects the small number of patients who received the drugs more than three times a week. The wide ranges of nonconformance rates for amitriptyline and chlordiazepoxide are ascribed to the small number of patients receiving those drugs in the five nursing homes. The most notable finding was the comparatively high rates of nonconformance for thioridazine (a major tranquilizer), the most frequently ordered psychoactive drug in nursing homes (NDTI 1975a,b).

In a study of 131 elderly nursing home patients, Ingman et al. (1975) found that patients with superior mental and physical abilities actually received more neuroactive substances (psychoactive drugs plus analgesics, skeletal muscle relaxants, antiparkinson drugs, and autonomic agents) than did

TABLE 15.—Percentage distribution of drug abuse mentions, by age and facility type

Facility	Age 6-9	10-19	20-29	30-39	40-49	50 and Over	Total
Drug Abuse Warning Network							
Emergency rooms	*	20	43	20	11	6	100
Crisis centers	*	40	50	7	2	1	100
Medical examiners	*	8	43	20	13	16	100
Inpatient units	1	17	49	18	8	6	100
Total DAWN System	*	27	44	16	8	5	100
1970 U.S. Census	18	17	15	12	12	26	100

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*Less than 0.5 percent.

SOURCE: Drug Abuse Warning Network (1974-1975)

patients with diminished mental and physical capacities. The differences were significant at the .05 level for both dimensions.

In a study of 53 female psychiatric inpatients aged 62-89, Barton and Hurst (1966) conducted a double-blind experiment in which an inert syrup was substituted for chlorpromazine. Patients were rated along seven dimensions by ward nurses, who did not know whether the patients were receiving chlorpromazine or the placebo. When the last week of chlorpromazine therapy was compared with the third week of placebo administration, five dimensions showed slight deterioration as measured by mean scores, while two dimensions showed no significant change. Ward nurses were unable to distinguish between patients receiving chlorpromazine and those receiving placebos. The results led the authors to conclude that 80 percent of the patients were receiving tranquilizers unnecessarily.

While the studies cited above cannot provide the basis for making generalizations about the magnitude or pattern of improper prescribing of psychoactive drugs to the elderly, they do provide at least some preliminary indications that the appropriateness of prescribing practices needs to be examined in greater depth and scope.

Drug-Related Illness and Death

Another issue that needs to be explored in relation to psychoactive drug use and the elderly is the extent to which that use may lead to drug-related illnesses or death. While we found no studies that estimate the proportion of the elderly population so affected, there are some studies that provide information on hospital admissions and deaths resulting from abuse of drugs.

One source of information is the Drug Abuse Warning Network (DAWN 1974-1975), a nationwide system which continuously monitors drug abuse contact reports from selected hospital emergency rooms, hospital inpatient units, crisis centers, and medical examiners (coroners). Although the DAWN data do not show the percentages of older people who contact the monitored facilities as a result of abuse of psychoactive drugs, they do indicate general patterns related to age and types of drugs abused.

Based upon data on selected leading drugs for the period April 1974 to April 1975, it appears that nearly half of all drug mentions are related to abuse of prescription psychoactive drugs. Minor tranquilizers account for 19 percent of all drug abuse contact mentions, followed by barbiturate sedatives (10 percent), nonbarbiturate sedatives (7 percent), stimulants (6 percent), and psychostimulants (2 percent). The most frequently mentioned individual drug was diazepam, which accounted for 10 percent of all mentions.

People aged 50 and over (the oldest age category represented), who constitute 26 percent of the U.S. population, accounted for 5 percent of all mentions in the total DAWN system (see table 15). That was the lowest proportionate representation among all adult age groups. The relatively low frequency of contact may be partially explained by the fact that people aged 50 and over are much less likely to abuse illicit drugs, thereby reducing the overall likelihood that they would contact the monitored facilities. (Petersen and Thomas [1975], for example, found that during 1972 no persons aged 50 and over who contacted a Florida hospital for acute drug reactions had done so as a result of abuse of illicit drugs.)

The comparatively low frequency of contact, however, also appears to carry over into the prescription psychoactive drugs. While DAWN data do not provide correlations between age and all prescription psychoactive drugs, information on selected individual drugs may be used as a rough indicator. Diazepam--the most frequently mentioned drug of abuse in the DAWN system--may serve as a case in point: People aged 50 and over accounted for only 7 percent of all diazepam mentions. Figures for other individual drugs are similar: chlordiazepoxide (8 percent); oxazepam (7 percent); phenobarbital (8 percent); butabarbital (8 percent); flurazepam (14 percent); secobarbital (8 percent); and pentobarbital (16 percent). Thus, it appears that the frequency of contacts due to abuse of prescription psychoactive drugs, as well as for all drugs, is comparatively low among people aged 50 and over.

The largest proportion of mentions (16 percent) accounted for by people aged 50 and over come from medical examiners (see table 15). Nearly two-third (62 percent) of the medical examiner mentions for people aged 50 and over were attributed to suicide gestures or attempts, a figure that is nearly twice as high as that for any other age group. A majority of emergency room mentions (50 percent) and inpatient unit mentions (53 percent) for people aged 50 and over were attributed to suicide gestures or attempts, figures which were also higher than those for other age groups.

Thus, it appears that people aged 50 and over are less likely to contact any of the monitored facilities (including medical examiners) as a result of drug abuse than are other adults, but when they do make contact, the pattern reflects a disproportionately high rate of deaths and suicide gestures or attempts. The DAWN data do not indicate to what extent those deaths or suicide attempts can be directly attributed to prescription psychoactive drugs. (Benson and Brodie [1975] have suggested that the high rate of chronic physical and mental illness--especially depression caused by social factors--among the elderly contributes significantly to suicide attempts, and that prescription psychoactive drugs are often used as a means.)

Petersen and Thomas (1975), in a study of acute drug reaction admissions to a Florida hospital, provide some supplementary data to the DAWN system, although the data are not necessarily representative. Consistent with the DAWN data, they found that, while people aged 50 and over constituted 39.0 percent of the county population served by the hospital, they represented only 5.4 percent of all admissions for acute drug reactions. Among those people aged 50 and over who were admitted to the hospital for acute drug reaction, nearly two-thirds (61.7 percent) were white females. Admissions for older females exceeded their distribution in the county population, as did admissions for older blacks (male and female). Nearly half (49.0 percent) of all aged admissions were for abuse of sedatives (as opposed to 35.9 percent for all ages) and nearly a third (31.9 percent) were for abuse of tranquilizers (as opposed to 24.4 percent for all ages). Roughly a third (35.0 percent) of aged admissions were associated with suicide attempts, a figure that was generally consistent with that for all ages (33.7 percent). In comparable settings, the DAWN data indicate that suicide attempts or gestures accounted for 53 percent of inpatient unit mentions for people aged 50 and over, as opposed to 28 percent for all ages. Thus, the Petersen and Thomas data on suicide attempts deviate from the patterns reported in the DAWN system.

In summary, we found no data that indicate the proportion of the elderly population for which illness or death can be attributed to abuse of prescription psychoactive drugs. There is evidence, however, which suggests that older people are less likely than other adults to be admitted to hospitals or to die as a consequence of abusing drugs. The comparatively low percentages of older people who contact DAWN-monitored facilities as a result of abuse of selected prescription psychoactive drugs, especially when considered in conjunction with the NDTI data cited earlier, suggest the possibility that older people may be particularly responsible in their use of those drugs.

OVER-THE-COUNTER PSYCHOACTIVE DRUGS

The manner in which over-the-counter (OTC) drugs are acquired and used makes it more difficult to obtain data on the nature and extent of their use than for prescription drugs. There are, for example, no equivalents to physicians' records or patients' charts to serve as useful data sources. Even

TABLE 16.—Self-reported use of OTC psychoactive drugs during the past year, by age and by by sex

Drug Class and Sex	Percent by Age Groups 18-29	30-44	45-59	60-74
Stimulants				
Men	17	2	2	2
Women	8	1	*	*
Sleeping pills				
Men	8	4	3	7
Women	7	7	4	5
Tranquilizers				
Men	4	1	1	2
Women	11	6	3	2
All psychoactive OTC drugs				
Men				
Any use in past year	25	7	5	9
No use in past year	75	93	95	91
Total	100	100	100	100
Women				
Any use in past year	21	12	7	7
No use in past year	79	88	93	93
Total	100	100	100	100

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*Less than 0.5 percent.

SOURCE: Parry et al. (1973)

pharmaceutical industry data, which can provide information on production and sales volume, cannot easily be correlated with user characteristics. Unlike prescription drugs, which are dispensed through a system involving the physician, pharmacist, and patient, consumers purchase and use OTC drugs in relative anonymity. The most likely source of information, then, appears to be the consumers themselves.

In the survey of national psychoactive drug use patterns by Parry et al. (1973), the interviews included questions related to use of OTC psychoactive drugs. Table 16 summarizes the findings on the percentages of men and women, by age group, who indicated use of OTC psychoactive drugs during a 1-year period preceding the interview. The classes of drugs represented are somewhat arbitrary since, as the authors pointed out, many of the tranquilizers used are advertised as having tranquilizing effects, but actually have the same ingredients as OTC sleeping pills.

In the 60-74 age group only 9 percent of men and 7 percent of women reported use of any OTC psychoactive drugs within the past year. OTC sleeping pills were the most commonly used drugs for both older men and women, although the percentages were relatively low (7 percent and 5 percent, respectively).

Unlike the patterns of prescription psychoactive drug use, the extent of use of OTC psychoactive drugs among older people is not disproportionately high. The highest prevalence rates for OTC drugs are in the age group 18-29.

The authors also reported data on OTC psychoactive drug use by geographic region, education, and Index of Social Position. They found use to be substantially higher in the West than in other regions of the country, and somewhat higher among those with more education and higher social position. Since those factors were not broken down by age group, however, it is not clear to what extent those patterns hold true for the age group 60-74.

Only 3 to 4 percent of people in all age groups indicated that they used both prescription and OTC psychoactive drugs.

SUMMARY AND CONCLUSIONS

Roughly a third (32 percent) of the elderly population (60-74 years of age) reported use of a prescription or over-the-counter psychoactive drug within a 1-year period. One-fifth (21 percent) of older men and one-third (32 percent) of older women reported use of a prescription psychoactive drug, while 9 percent of older men and 7 percent of older women reported use of an OTC psychoactive drug.

The most widely used classes of prescription psychoactive drugs among older men and women were minor tranquilizers/sedatives (11 percent of older men, 25 percent of older women) and hypnotics (7 percent of older men, 8 percent of older women), both of which were used by greater proportions of older men and women than other age groups. The most widely used class of OTC psychoactive drugs among older men and women was sleeping pills (7 percent of older men, 5 percent of older women) although, as was the case for all OTC classes, smaller percentages of older men and women used them than did those in the age group 18-20.

Older people (65 years of age and over) received disproportionately high percentages of orders for most prescription psychoactive drugs sampled from the NDTI, especially among the sedatives and hypnotics. As is the general case in relation to prescribing patterns by sex, older women received substantially more orders for psychoactive drugs than did older men.

The data cited on prescription psychoactive drug use among institutionalized elderly populations were inadequate for making general statements about national patterns of use. Among the studies reported, however, major tranquilizers and hypnotics were found to be the psychoactive drugs most widely used in nursing homes. Major tranquilizers were the psychoactive drugs most widely used among elderly psychiatric inpatients, especially among those diagnosed as schizophrenic; however, contrary to use patterns in the general population, both the percentage of people using psychoactive drugs and the dosage per drug, as well as the prevalence of polypharmacy, tended to decline with increasing age.

Reported studies of noncompliance failed to establish any significant relationship between noncompliance and demographic variables. In general, however, the magnitude of noncompliance reported in various studies ranged from 25 percent to 59 percent of patients sampled. Data presented on the extent of improper prescribing practices were insufficient for generalization. Data on the percentages of older people who contact hospitals, crisis centers, and medical examiners (coroners) as a result of abuse of drugs indicate that older people are less likely to do so than are other adults, although when they do make contact, it is likely to be related to suicide attempts.

In general, the limited nature of most of the published studies cited in this report has made it impossible to present a comprehensive profile of psychoactive drug use among the elderly. To suggest that data are not available, however, is not to imply that data sources do not exist; on the contrary, the potential for research in the area of psychoactive drug use and the elderly is promising. The National Disease and Therapeutic Index, for example, is rich in unmined information. NDTI data could be broken down by age, sex, type of drug, diagnosis, and location of patient, constituting a comprehensive national sample of prescription psychoactive drug orders. A major drawback of the NDTI, unfortunately, is that it is a privately published data source, thereby restricting access and publication potential; it is also based on voluntary reporting, which may affect its representativeness. Physicians' records, pharmacists' records, and patient interviews are other sources of data that could be utilized for national or regional samples.

In terms of directions for further research, more information is needed on the nature and extent of psychoactive drug use among the elderly. The survey by Parry et al., for example, provided very useful data on national patterns of psychoactive drug use; however, it dealt with only the broadest classes of psychoactive drugs (combining minor tranquilizers and sedatives), and it did not survey the elderly living in institutional settings. Ideally, future research could provide more information on prescribing and use of individual drugs as well as drug classes, and correlate the data with diagnoses and location of the patient (nursing home, hospital, etc.). Such a profile could provide better insights into the reasons why older people use (or are issued) psychoactive drugs, in addition to providing more detailed information on patterns of use.

More information is also needed on the extent of, and reasons for, misuse of psychoactive drugs. The studies of noncompliance, for example, have not generally been comprehensive enough to develop an accurate picture of the extent to which older people make medication errors for prescription drugs in general, or for psychoactive drugs in particular. Another issue that deserves particular attention is the improper prescribing and administering of psychoactive drugs. Older people would appear to be especially vulnerable to improper prescribing since the physiological changes associated with aging can have a significant effect on the way in which drugs are metabolized (Piland 1977). In addition, there has been some suggestion that the prescribing and administering of drugs in nursing homes are often accomplished without adequate safeguards, and are sometimes carried out with the regimen of the home as a primary consideration (U.S. Senate 1973; Learoyd 1972). As a general principle, the disproportionate use of psychoactive drugs by the elderly should warrant a close examination of the appropriateness of that use.

As a final comment, it has been apparent throughout this report that the reliance on individual case studies has often led to situations where data were not comparable due to differences in methodology or categories employed. The development of a data base on psychoactive drug use and the elderly would seem to require some future efforts to insure greater consistency between studies.

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PSYCHOACTIVE DRUG MISUSE AMONG THE ELDERLY: A REVIEW OF PREVENTION AND TREATMENT PROGRAMS

James Gollub

INTRODUCTION

The elderly consume over 25 percent of all prescription drugs. An increasing proportion of these prescriptions is accounted for by psychoactive drugs, defined in this paper as major and minor tranquilizers, antidepressants, stimulants, sedatives, and hypnotics.

There is growing, though limited, evidence of intentional and nonintentional misuse of psychoactive drugs by the aged, often resulting in physical and social harm (Eisdorfer and Stotsky 1977). Sometimes faulty diagnosis and application by the physician is the causal factor, while in other cases the individual may make a deliberate choice to misuse a drug, or may simply make a mistake.

Recognition of this problem has led to the development of intervention programs both for more accurate diagnoses of symptoms arising from complex medical and psychosocial problems and as environmental supports that afford the older individual an alternative to the misuse of psychoactive drugs. Only a few programs have been identified which are directly concerned with drug misuse by the elderly; however, other existing service programs could provide the basis for expansion or modification of service components to deal with drug abuse among aged persons. This report provides overviews of 1) programs that monitor the diagnosis, prescription, and administration of psychoactive drugs, and 2) programs designed to intervene in psychoactive drug misuse among the elderly.

A survey of the literature on drug misuse among the elderly reveals that misuse occurs at any point in the continuum of health care. Ten factors conducive to the misapplication or misuse of psychoactive drugs among the elderly have been identified in this report and fall into two categories: those attributable to health professionals and those attributable to the elderly. Actions for which health professionals may be responsible include:

- Inaccurate diagnosis
- Inaccuracies in drug treatment
- Polypharmacy, including failure to consider drug interactions
- Deliberate overmedication of arbitrary medication (institutional patterns).

Misuse by elderly persons includes:

- Drug overdoses, due either to emotional disturbance or to error
- Misuse, due to behavior resulting from organic brain disease
- Use of multiple prescriptions without the physician's knowledge
- Overuse of prescriptions without the physician's knowledge, including improper use of automatic refills and telephone prescriptions
- Exchange of drugs between individuals
- Use of expired drugs

The conditions that contribute to the misuse of psychoactive drugs among the elderly have been the subject of intervention programs in medicine, pharmacy, psychiatry, nursing, social work, and other related areas.

METHOD

The information for this report was derived from an extensive survey of the literature in the field of health and social services, supplemented by interviews with, and materials from, researchers and service providers in the fields of gerontology, psychiatry, psychopharmacology, pharmacy, nursing, drug-abuse intervention, and social work.

The search for programs dealing with the misuse of psychoactive drugs among the elderly revealed that very few such programs exist. Most programs are not concerned specifically with the elderly as the sole or major client. Although there are social service programs which serve the elderly consumer--such as hospitals, nursing homes, pharmacies, clinics, and community mental health programs--these programs are not reviewed in this report. This report reviews programs directly relevant to the problem of psychoactive drug use among the elderly.

Intervention programs that address the problem of psychoactive drug misuses by the elderly fall into two categories which reflect the current policies of health care and social service providers. The first category of intervention programs, initiated by health care providers, deals with errors of diagnosis, prescription, and drug administration by the health professional. This category includes programs of medical and psychiatric diagnosis that ensure appropriate treatment of the aged as well as retroactive and continuous drug-consumption monitoring in inpatient and outpatient settings (including mental health centers, nursing facilities, and housing environments).

The second category consists of those programs specifically designed to permit intervention in, and treatment of, the problems of psychoactive and other drug misuse among the elderly. Programs addressing this problem include chemical dependency outreach, referral, treatment, and followup programs; acute- and chronic-care programs for alcoholics and drug users; drug education programs; peer counseling; and behavioral therapy. These programs are initiated by health care professionals, by social service agencies, and sometimes by concerned individuals.

PROGRAMS THAT MONITOR THE DIAGNOSIS, PRESCRIPTION, AND ADMINISTRATION OF PSYCHOACTIVE DRUGS

INTRODUCTION

The increased sensitivity to drugs among older persons, and the potential for altered effects when drugs are used in combination, are important reasons why drug users and drug regimens should be carefully scrutinized by medical personnel. Pharmaceutical researchers and physicians in recent years have focused on the related issues of diagnosis of disorders, accurate prescribing for the elderly, general control of monitoring of the prescription process, and patterns of use by specific client groups. Much of this focus has been aimed at developing improved monitoring tools for institutions and community pharmacies, and on increasing the knowledge of medical practitioners in the area of drugs and their applications to and use by the elderly. Efforts to develop programs of intervention and alternatives to psychoactive drug use by the aged include the following:

- Improved diagnostic procedures
- Improved physician knowledge of age-oriented prescribing of medications
- Alternative methods of administering drugs
- Computerized and manual evaluations of drug use and impact in institutions, in the community, and in training programs
- Increased involvement of pharmacists in drug monitoring

The following sections of this report provide overviews of programs in each category.

THE ROLE OF DIAGNOSTIC PROCEDURES AND PROGRAMS IN REDUCING PSYCHOACTIVE DRUG MISUSE

Accurate diagnosis in the treatment of the elderly is crucial to the reduction of drug misuse, either intentional or nonintentional. Changes that occur in the social life, physiologic structure, and psychosocial environment of the older person often produce symptoms deceptively similar to those of more serious disorders, such as organic brain syndrome (Fann et al. 1976). In some instances, the solution is as simple as recognizing that the presenting problem is nonpsychiatric and therefore does not require a prescription for psychoactive drugs. The physician who understands the symptomatology of disease and aging will be better able to determine when it is more appropriate to suggest a social worker than to prescribe a psychoactive drug (Hall 1973).

Conversely, failure to diagnose psychiatric disturbance can lead to faulty treatment and create new medical problems for the older person. Burville (1971) points out that mental problems are overlooked in up to 50 percent of any group of medical or surgical patients. The probability of nondiagnosis of mental disorder in the elderly patient, where an underlying mental disorder may be masked by a somatic complaint, is even higher (Mechanic 1972). Schuckit et al. (1975) also stress the need for accurate diagnostic criteria applicable to older populations. Using personal interviews and chart reviews, Schuckit et al. (1975) established the prevalence of unrecognized psychiatric disorders in elderly medical and surgical patients at a Veterans Administration hospital. They attempted to integrate present criteria for these disorders into their diagnostic procedure (Alexander 1972; Foley 1971) and identified major mental undiagnosed disorders in 24 percent of their study population. This identification of undiagnosed disorders suggests that there is great potential for improvement of medical treatment of the aging patient, with particular reference to the prescription of psychoactive medications.

The two programs discussed below provide examples of diagnostic services geared specifically toward the geriatric patients, which help reduce the likelihood of improper diagnoses. Services include clinical assessment from a multidisciplinary approach, education, and consultation with physicians, patients, and families.

The Philadelphia Geriatric Center

Psychological assessment of the elderly has been considered at length by members of the Philadelphia Geriatric Center, who have developed a program specifically oriented toward the clinical assessment of the older person for the purpose of determining appropriate treatment (Whelihan 1976). The Philadelphia Geriatric Center's Baer Consultation and Diagnostic Center uses a multidisciplinary approach and assesses function from biomedical, psychological, and social points of view. The diagnostic process includes a complete medical history and physical examination, medical laboratory and pulmonary function tests, X-ray and electrocardiograph studies, ophthalmological and audiometric examinations, neurological and EEG studies, social work and evaluation of activities of daily living, nutritional assessment, and psychological and psychiatric examinations. Computerized tomography studies and brain scans are frequently performed.

The diagnostic procedures are followed by a team conference, where the findings of the various disciplines are analyzed and integrated to provide a picture of overall strengths and weaknesses. At a second conference, the client and his or her family receive a detailed verbal report. Reports from each discipline are then sent to the primary care physician; a shorter report in layman's language is forwarded to the client. A 6-month followup monitors progress.

The psychologists systematically evaluate cognitive, behavioral, and emotional functioning in the elderly client. Functional analysis of the person vis-a-vis the environment (Lawton 1970) and the administration of psychological tests designed specifically for the elderly client assure that all areas of functioning are considered. Incorporation of both neuropsychological and psychological assessment tests in a single diagnostic package increases corroboration of observations concerning behavioral symptoms and physiological damage, and it also enhances the probability of correct treatment, thus reducing the likelihood of inappropriate use of psychoactive drugs.

Southeast/Bayview Mental Health Center, Geriatric Services Program

The Southeast/Bayview Mental Health Center, Geriatric Services Program, in San Francisco, California, also shows that evaluation and health service delivery media can play a critical role in ascertaining the specific mental and physical health needs of older adults before they are prematurely or inappropriately assigned to institutional settings.

The Geriatric Services Program uses a multidisciplinary service team of psychiatric social workers, psychiatrists, and a senior aide. A physician is available for consultation and medical assessment, when indicated. The program emphasizes prompt evaluation, treatment, and followup in the care of the elderly. Precrisis intervention is aimed at maintaining the elderly person at optimum functioning in his or her own home. Home services are a major mode of treatment, supplemented by day-hospitalization for those who require it.

Primary prevention, including education, consultation, and community organization services, focuses on the causative factors of mental illness in the elderly. Secondary prevention uses geriatric evaluation techniques to distinguish between irreversible chronic brain disease and acute reversible brain syndrome due to drug toxicity, electrolyte imbalance, infection, vitamin deficiency, endogenous depression, or malnutrition (all of which can cause an individual to manifest overt symptoms similar to those of chronic organic brain syndrome). The diagnosis of disorders other than chronic brain syndrome often enables older persons to be treated in their homes, thereby preventing institutionalization.

The immediate priorities of the program include:

- Distribution of Resources Handbook for Seniors
- Identification of residents in need of service and treatment by Geriatric Services staff; aggressive case finding, development of followup-care and after-care programs for the elderly in their own homes and care facilities; liaison with Napa State Hospital for evaluation of patients and their return to the community, where appropriate; and implementation of State-mandated continuing care services to track, link, monitor, and refer certain patients who have been discharged from crisis outpatient services.

THE ROLE OF PRESCRIPTION AND ADMINISTRATION CONTROLS IN REDUCING PSYCHOACTIVE DRUG MISUSE

After a specific mental disorder has been appropriately diagnosed, there still remains ample opportunity for misapplication of therapeutic treatment. The source of error in these cases is not related to selection of treatment, for there are fairly standard guidelines for the application of psychoactive drugs to the treatment of psychiatric disorders. The problem is related to the effect of the physiological changes that occur with age on the older person's sensitivity to and tolerance of specific drugs. The hazards that may be related to physiologic change are also compounded when a multiple drug regimen is used.

In response to the problems of drug/person compatibility, pharmacists and doctors have evolved guidelines for use in prescribing for the elderly. Among the examples of guidelines discussed below are the review of factors related to patient history, current mental and physical status, and actual amounts of drugs required for therapeutic results.

Lamy Approach

Lamy has developed procedures for reducing drug misuse in his own clinical practice. Lamy (1976) points out the hazard that drugs may pose to the aged, particularly certain psychoactive drugs such as the phenothiazines and barbiturates, and suggests that many drug-induced illnesses are not detected because of their similarity to stereotypical aspects of old age such as forgetfulness, weakness, confusion, tremor, anorexia, and anxiety.

Lamy urges caution in geriatric prescribing based on physiological and pharmacological difference in treating the aged, and suggests a careful drug history and periodic review of drug consumption. He also states that the wise physician will not take for granted that the patient a) has the prescription filled, b) understands how to take the medicine, c) is taking no medication other than that which the physician has prescribed, d) continues to take the prescribed drug, and e) accurately reports intake and adverse reactions. Lamy proposes a systematic approach to prescribing for the geriatric patient, a system that would include careful diagnosis, recordkeeping, and reevaluation of the treatment. He also believes that pharmacy records and drug labeling are important tools to insure proper use of prescribed drugs.

Hall Approach

Hall (1973) also recognized the need for extra caution when treating the elderly with pharmacologically active drugs and drew up a list of simple rules pertaining to drug use by the elderly. These rules constitute an informal program that, within the context of Lamy's more comprehensive process, might promote more careful prescription and use of psychoactive drugs among the aged (De Groot 1974). The program consists of six points:

- Knowledge of the pharmacological action of the drug, and how it is metabolized;
- Use of the lowest effective dose in the individual patient; in practice, this means that the dosage should always be titrated with patient response;
- Use of the minimum number of drugs necessary; since memory tends to deteriorate with age, patients may neglect to take their medications if drug regimens are too complex;
- Avoidance of the use of drugs to treat symptoms, seeking rather to treat the cause; mental disturbance in the elderly patient is often diagnosed as senile psychosis without adequate consideration of alternative diagnoses;
- Neither withholding medication because the patient is "too old" nor continuing to use a drug when its side effects are worse than the patient's original symptoms; and

- Use of a drug for no longer a period than is necessary.

Drug Spotlight Program

The Drug Spotlight Program is another informational program designed to improve pharmacists' and physicians' knowledge of drug qualities and interactions. Through the joint efforts of several national hospitals and medical, nursing, and pharmacy groups, a program of continuing education has been initiated that is aimed at helping pharmacy and therapeutic committees of local hospitals review and, when necessary, improve drug therapy. The Drug Spotlight Program was initiated by the American Society for Clinical Pharmacology and Therapeutics; participants include the American Academy of Family Physicians, the American College of Pharmacists, the American College of Surgeons, and many other professional organizations. The specific goals of the Drug Spotlight Program (Reilly 1972) are:

- To achieve maximally effective drug therapy;
- To reduce the incidence of serious adverse drug reactions; and
- To achieve the lowest cost for drug therapy compatible with maximum effectiveness and safety.

A national advisory committee selects four drug groups to be "spotlighted" during the coming year, and suggests that these drugs be the focus of study by local hospitals, pharmacies, and therapeutic committees. The activities of the Drug Spotlight Program also include publication of scientific papers and editorials on the subject of the target drugs.

ALTERNATIVE METHODS OF DRUG ADMINISTRATION

Researchers in pharmacy and medicine have also initiated experimental programs that offer alternative approaches to the traditional patterns of drug administration, programs that may help avert specific types of drug misuse. In the two approaches described below, one emphasizes the value of teaching inpatients how to self-medicate in preparation for their release, while the other focuses on minimizing medication error by reducing drug dosages to once per day.

Libow and Mehl Approach

Libow and Mehl (1970) piloted a program using patient self-administration of therapeutic drugs to circumvent the problems a person encounters when he or she must adjust to self-administration of medications following release from a hospital or nursing home. In this program, 20 elderly, frail, chronically ill patients were given medications for self-administration while in the hospital. They were judged by nurses and staff to be in a "good" mental state, resembling that of the physically ill elderly who reside in the community. The subjects in this program had significant medical diseases. In some cases the disease was in the subacute phase; in others, it was quiescent. The test "medications" were placebos (sugar), which patients were told would increase "appetite and strength." The medicine was issued in the usual pharmacy vial with the usual label, accompanied by verbal instructions from the physician. The subjects were instructed when and how much to take of the medication. Every few days, the physician counted the remaining medications in each vial and questioned the patients about their general well-being, appetite, and strength.

Of the 20 patients self-administering their medicines, five made errors. In 588 opportunities, there were 14 errors (2.3 percent); 6 errors were made by one patient. The results show impressive abilities for self-administration of medication, although this was probably enhanced by the structure of the study. The study period was brief, and participation was stimulating for the patients. The approach permits the patient to "learn" the medication schedule while under the "teaching" direction of the hospital staff. The inabilities raise questions about realistic post-hospital medication planning, e.g., should diuretics be given parenterally or orally; should prescribed drugs be variously shaped rather than several white tablets; and what would be the most convenient schedule? The ultimate goals of this program are to free nursing time for other tasks, to reduce post-hospital morbidity caused by patients' medication errors, and reduce hospital costs.

Ayd Approach

Drug administration within the psychiatric institution has been explored by Frank Ayd, Jr. (1975), who suggests a program of once-a-day drug dosage as a means of reducing noncompliance, the hazards of polypharmacy, and the unnecessary use of psychoactive drugs by the aging patient. Ayd argues that the aging brain is particularly sensitive to psychopharmaceuticals and that it is likely that at least 20 percent of psychogeriatric admissions are precipitated by the adverse effects of psychoactive drugs (Learoyd 1972). Polypharmacy and the consequent complexity of drug schedules complicate administration and are a burden on nurses. Error is inevitable, increasing in frequency with the complexity of drug regimens.

Ayd suggests that the total daily dose of many drugs now prescribed in divided doses could be administered once or twice daily, in the morning and/or evening. This pattern of administration has several advantages: 1) a single dose is more convenient for both patient and staff than divided daily doses; 2) outpatients who self-medicate, and families who have to medicate patients, find a single daily dose convenient, easy to remember, and economical.

Ayd refutes the objection that single-dose administration may increase side effects. DiMascio and Shader (1969) address claims that a single dose may be less effective than divided doses: "While few studies have shown a clinical superiority of the daily or twice daily schedule over the multiple dose schedule, none have reported the reverse." While such a program has yet to be tested extensively, it represents another attempt to minimize the problems encountered by the elderly in their use of drugs.

MONITORING THE PRESCRIPTION AND USE OF DRUGS

Formalized methods for monitoring drug use have existed for a long time, particularly in institutional settings; however, the processes of prescribing, dispensing, administering, and taking drugs (Brodie 1971) have often been studied for their role in fiscal management of medical supplies, rather than as a mode for ensuring appropriate therapy for patients.

Pharmacists have long had the opportunity to informally monitor drug prescription--both by reviewing amounts and dosages in the dispensing area and by checking the appropriateness of drugs selected in the ward (Knoben 1976). In the case of the community pharmacist, a review of a patient's history of drug use when comprehensive drug profiles are available can be accomplished, although some studies indicate that profiles have not been adequately used in determining actual or potential drug interaction hazards (Nelson et al. 1976). If a drug is given in the hospital or nursing home, the nurse provides another review of drug and dosage prior to administration.

Utilization studies of specific drugs or classes of drugs have been conducted by pharmacy and therapeutics committees, either routinely or in response to a potential problem. The ongoing medical audit of care, normally carried out by hospital review committees, generally includes a review of the treatment regimen.

Methods for carrying out drug monitoring and utilization studies have become highly technical in recent years. Computers, and the use of remote terminals at pharmacies and clinics, have enabled programs to maintain updated medical and pharmacy records of many patients and customers, as well as to compare drugs in use for interactive potential and for indicators of overuse and expiration of prescriptions.

Innovative programs for monitoring drug prescription and use are discussed below and include computer monitoring programs, community monitoring programs, institutional monitoring programs, programs in training monitoring skills, and drug use evaluation programs. While these programs do not directly address the problem of drug misuse by the elderly, the problem is subsumed in their broad applicability.

Computer Monitoring and Utilization Programs

Computer drug utilization review (DUR) programs are a new dimension in monitoring institutional patterns of drug prescription and consumption. Computer systems are used most frequently in institutional studies because of the greater accessibility of both patient medication data and data-processing equipment. However, computer drug utilization systems have also been used in the community to identify patterns of drug prescription and use by community pharmacy clients and by outpatients in health maintenance organizations and medical clinics. Prospective review systems are located at the Los Angeles County-University of Southern California (LAC-USC); the Medical University of South Carolina, Family Practice Clinic MIIS System; the Drug Intake and Management System (DIMES) in Massachusetts; and Monitoring and Evaluation of Drug Interactions by a Pharmacy Oriented Reporting System (MEDIPHOR) at Stanford, California. Retrospective drug use systems (including the LAC-USC and MEDIPHOR systems) include the PAID program in North Carolina, the Columbia Medical Clinic in Maryland, and the New Haven Health Care Plan in Connecticut.

The purpose of the drug review and control processes mentioned above is "rational prescribing," which is described by the Task Force on Prescription Drugs as "...the right drug for the right patient at the right time" (Task Force on Prescription Drugs 1969).

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The LAC-USC System

In 1967, medical professionals at the Los Angeles County-University of Southern California (LAC-USC) Medical Center published a description of the first computer system that combined on-line prescription processing and review procedures. The aims of this kind of system are to 1) prevent excessive dispensing of drugs with known abuse potential; 2) prevent harmful drug interactions by surveying the patient's drug record before a new prescription is processed; 3) insure and monitor the proper drug and dosage for intended clinical purpose; 4) study the drug usage patterns and correct inefficient expenditures of funds through redirecting purchases of specific drugs; and 5) implement inventory control. The use of this system to perform prospective and retrospective drug use review has been highly successful. Prospective utilization to prevent potentially harmful drug interactions revealed that 7 percent of outpatient prescriptions were potentially dangerous. The process has been used to improve prescription patterns for antibiotics and hypertensive medications. With the advent of the Professional Standards Review Organizations and Health Maintenance Organizations, it is probably that greater emphasis will be placed on the role of systems for prospective and retrospective monitoring of drug use.

Medical University of South Carolina, Family Practice Clinic Program

At the Medical University of South Carolina's Family Practice Clinic, a computer-based system to monitor outpatient drug use is part of a comprehensive medical record system (Braunstein and James 1976). The pharmacy subsystem has been under development and revision for approximately 3 years (Karig et al. 1974) and has been fully operational in the Family Practice Center for approximately 1 year. The system stores records of 6,000 patients using the Family Center facilities. The monitoring system assumes that 1) practice of medicine in the outpatient situation is based largely on pharmaceutical intervention in disease processes (i.e., drugs, not surgery) and 2) the physician in an outpatient setting cannot supervise the patient's drug therapy as closely as the physician in an inpatient setting.

The pharmacy system has four parts:

- The pharmacist at the computer terminal enters the new drug into the patient's profile. The profile displays patient status information (e.g., Medicaid), information on the interaction potential of the prescribed drug (Martin 1971), and educational information for the patient. The label for the medicine is printed at a terminal in clear English.
- The patient's history is displayed, including dates of drug renewals.
- A short sequence on the characteristics and use of drugs other than the new prescription appears.
- A warning of potential drug-drug interaction of the new prescription and any drugs the patient is currently taking is displayed.

The computer also produces a weekly report listing all patients who returned at an inappropriate interval for a renewal or who did not return at all. The computer completes drug searches, listing all patients with a history of using a particular drug and indicating those individuals currently using the drug in question, which is useful for large-scale drug utilization studies.

Members of the center may use any pharmacy in the area, because the pharmacists record prescription data on postcards and send it to the center for entry on the computer profile. The system increases communication between physician and pharmacist, and reduces misuse of drugs in cases where the physician and pharmacist can interact with the patient.

The DIMES System

A computerized drug-management system that is in the implementation phase in Massachusetts is the Drug Intake Management and Evaluation System, or DIMES (La Brie Associates 1976). This computer-based diagnostic, information-storage and retrieval system monitors the use of psychoactive drugs in both hospital and outpatient clinic settings.

The DIMES system is currently capable of monitoring 125 drugs (both psychoactive and medical) commonly prescribed to psychiatric patients. As the system is further refined, more drugs will be added. Using the system's stored information, the computer evaluates the following questions and prints out the answers.

- Do the symptoms match the diagnosis?
- Is the drug prescribed consistent with the symptoms and diagnosis?
- Is the drug within effective dose range and below maximum dose?

- Does the patient have any medical conditions for which the drug is contraindicated?

- Is the patient taking any other medical or psychoactive drugs that have potentially negative interactions with this drug?

- Is the drug available in a more cost-effective form?

- Are new symptoms that occur after medication side effects of the current medication?

- Does a review of the patient's symptom history indicate the changes should be made in the drug administration schedule?

- Does a review of the patient's drug intake record suggest that changes should be made in the drug schedule?

Patients' current information files are available at any time, and periodic reviews of their symptom histories and drug intake records are generated automatically (with the introduction of each set of current symptoms) when new entries are made. The system also accepts previously generated patient medication profiles, which enables the DIMES system to begin functioning with an active database.

The MEDIPHOR System

The MEDIPHOR system (Tatro et al. 1975) is a computer-based monitoring and reporting system developed at Stanford University to study drug interactions in hospitalized patients. It has recently been adapted to monitor in community settings as well. The system uses information entered at a central inpatient pharmacy to monitor drug use, creates patient medication profiles, and generates drug interaction reports. It also prints or displays patient medication profiles.

The community pharmacy component of the MEDIPHOR system is particularly relevant to the elderly psychoactive drug user. The community pharmacy involved in the development of the prototype of the MEDIPHOR system (MEDIPHOR-C) is located near Stanford University, and has a prescription volume of approximately 175 per day. The process is as follows:

- The patient enters the pharmacy with one or more prescriptions;

- Responding to a series of prompts on a CRT, the prescription information is entered by the pharmacist and relayed to the central computer;

- The central computer formats a prescription label from the information received and sends this information back to the pharmacy; and

- An interaction search is performed by the central computer, matching the newly prescribed drug(s) against the previously stored patient profile information. If potential drug interactions are found, a short message ("mini-alert") is relayed to the label printer in the pharmacy with the patient's name, the interacting drugs, and a short description of the anticipated interaction.

These "mini-alerts" are divided into two groups. Group A includes those interactions for which telephone notification of the prescribing physician is desirable before the medication is dispensed to the patient. Group B interactions, because of lesser immediacy and/or severity, do not require such notification. For both groups, a full interaction report is printed by computer and is sent to the prescribing physician the next day.

Community Monitoring Programs

The computer drug-monitoring systems discussed above are highly technical methods of managing large amounts of data and drug-related questions in a short period of time. At the present time, there are few pharmacies and community clinics that have access to, or can afford to purchase, the services of this type of monitoring system. The most common and the most economically feasible alternatives are manual monitoring systems. Critical factors in these systems include awareness of all facets of drug-drug interaction and drug/body chemistry/food interaction, as well as the behavioral correlates of drug abuse. As a response to the need for monitoring of drugs in the community, pharmacists have initiated new roles and technical assistance approaches to improve their capacity to perform their job well.

The DIAL System

A noncomputerized system for detecting potential drug interactions, the DIAL system (Drug Interaction Alert System) is a compact procedure that uses a flow chart and a cross-indexed list of drug interactions to enable the pharmacist to evaluate a given patient's potential for experiencing drug interaction effects from a new prescription (Fish and Cooper 1975).

The DIAL system requires the pharmacist, upon receiving a new prescription order, to obtain the patient medication profile, the Drug

Interaction Alert List, and the Drug Interaction Flow Chart. Following the steps of the flow chart, the pharmacist answers a series of questions. The first question asks if any of the ingredients on the new prescription appear on DIAL. The pharmacist checks the profile for any existing prescription for which there are possible interactive drugs. He then identifies the potential interactions between the old prescription and the new. If likely drug interactions are identified, the pharmacist checks to see if the physician has anticipated the interactions and has prescribed compensatory drugs. If not, the pharmacist contacts the physician. An alternate medication may be prescribed by the physician, or the original prescription may be issued with appropriate warnings to the patient. All drugs with known interaction potential being taken by the patient are noted in the patient profile.

DIAL has been used successfully in hospital, nursing home, and community settings. The system could easily be computerized for monitoring large volumes of patient drug use data. However, it lacks a patient profile system specifically oriented to the monitoring task. The DIAL system has several attractive features, particularly its economy. It also permits a recordkeeping process that can be adapted to aspects of drug consumption other than drug interactions.

Tennessee Medication Maintenance Program

A program in Tennessee demonstrates that the pharmacist can perform a significant role in the treatment and maintenance of mentally ill patients in the community (Evans 1976). The program's objective was to establish and operate a model medication maintenance service in a community pharmacy, using support from the Northeast Community Mental Health Center, and subsequently, to conduct a limited evaluation of the model program in 1) patient acceptance of location and pharmacist's role and 2) quality of care.

Problems such as medication noncompliance, drug side effects, drug interactions, and minor alterations in the patient's mental status were handled by the pharmacist. However, telephone consultations with the psychiatrist were also used, particularly in the case of an uncontrolled patient. These actions were followed by dispensation of medications, review of the patient's need for education regarding aspects of the drug therapy, entry of information into the patient's progress notes, necessary referrals to the Center, and scheduling of the patient's next appointment.

The program was well accepted by mental health professionals and some patients. The data showed an overall improvement in participating patients, and suggested that selected patients could be safely maintained by the community pharmacy as part of an outreach program.

A program of this kind, though not aimed at the elderly per se, has a high degree of relevance to psychoactive drug use problems among this group. It is apparent that any formerly institutionalized older person who desires to return to the community might respond positively to the maintenance services this kind of program offers.

Institutional Monitoring Programs

High levels of drug use occur in institutions as might be expected in an environment where people are experiencing health problems. Medications are often prescribed to alleviate pain and anxiety, or to control undesired behaviors, in amounts that may be very strong, or for lengths of time that go beyond the boundaries of therapeutic benefit. As a means of averting misuse of drugs under these circumstances, drug utilization reviews were mandated by law. However, the DUR process does not call for continual monitoring and review of medications for each patient, or even for frequent reviews of each patient's regimen. New monitoring processes have been devised to address this need. Community and institutional pharmacists have also found new roles in working in institutional settings and working with nurses and doctors to insure appropriate use of drugs.

Appalachian Regional Hospitals Program

In 1971, a study outlined by the Appalachian Regional Hospitals pharmacy staff was conducted at the Wise, Virginia, Regional Hospital (Solomon et al. 1974). The major goal of the study was to determine the pharmacist's ability to detect potential therapeutic problems by using a patient medication profile. It was assumed that 1) far more therapeutic problems will be detected by the pharmacist with, than without the use of a patient medication profile; 2) the incidence of therapeutic problems will be higher for new prescriptions than for refill prescriptions; 3) the overuse of medications will be the most common therapeutic problem; 4) prescriptions financed by a third-party payor will more commonly be overused than underused; 5) medications payed for directly by the patient will more commonly be underused than overused; 6) psychotherapeutic drugs will be overused more often than drugs in other classifications; and 7) the potential misuse of medications (either overutilization or underutilization) will be more prevalent among patients 65 years of age and over than among patients in other age groups.

The results of the study indicate that the use of medical profiles by the pharmacist enables him to detect potential therapeutic problems that otherwise would go undetected for extended periods of time. Since it is believed that self-medication errors in nonmonitored cases occur in between 25 percent and 59 percent of all users (Stewart and Cluff 1972), pharmacist intervention would appear to be a valuable monitoring service. Because of this high level of self-medication error and potential for intervention, there is serious reason to further consider the validity and need for legally mandated monitoring services in both ambulatory and long-term care facilities where they do not already exist.

California Regional Medical Programs Area V

In 1972, the California Regional Medical Programs Area V funded a study to document potential contributions of pharmaceutical service providers to nursing facilities and extended care facilities. The objectives of the study were to demonstrate that 1) the application of clinical pharmacy practice in an extended care facility can improve the quality and cost-effectiveness of patient care through promotion of safe and rational use of drugs, and 2) expanded use of the community's existing pharmacy manpower can be integrated into quality health care services.

The study was implemented in four extended-care facilities. A clinical pharmacist was appointed by the University of Southern California School of Pharmacy to work in the experimental extended care facilities, spending a month at each facility. The responsibilities of the clinical pharmacist in the experimental extended-care facilities included the following:

- To obtain a drug history of each patient on admission and to maintain each patient's drug profile;
- To evaluate each patient's clinical response or lack of response to drug therapy, including adverse drug reactions, and to verify these reactions with the patient's physicians;
- To provide drug information to the staff of the extended care facility and the patient's physicians;
- To instruct discharged patients and their families in the proper use of medications;
- To participate in the extended-care facility's drug utilization review committee; and
- To consult with the staff on their systems of procurement, preparation, and distribution of drugs.

Results of the study indicated that the incidence of medication error and inappropriate drug use was reduced as was the incidence of adverse drug reactions and drug interactions.

The study improved the cost-effectiveness of patient care because of the fewer drug-induced complications and fewer inappropriate drugs. The overall savings was $80,000, excluding the cost of the pharmacist's services. The authors suggested that a reimbursement system would persuade the community pharmacist to provide clinical pharmacy services to patients in extended-care facilities. In July 1975, the California Department of Health began to reimburse pharmacists for the drug-monitoring services that the pharmacists are required to perform. This offers the pharmacist a significant incentive to provide comprehensive patient-oriented pharmacy services and thereby control and reduce the inappropriate use of psychoactive drugs.

Isabella Geriatric Center Programs

The Isabella Geriatric Center is an example of drug monitoring at different levels of institutional and parainstitutional care through one central organization. The ongoing services at Isabella also attest to the significance of the nurse and pharmacist in promoting proper use of drugs by the elderly. The Isabella Center has three levels of housing and service for the aged: congregate housing apartments (250 persons), intermediate nursing care (Home Health Related Facility), and a nursing home.

Pharmacy services to apartment residents are similar to community pharmacy dispensing, including patient profiles. When a "House" resident presents a new prescription or a refill request to the pharmacist, the profile is automatically examined. (As in community pharmacies, full supervision of drugs used in the apartment house area is impossible since residents are not required to use Isabella home medical staff.) Charge slips for medications provide the pharmacist with a daily accounting system used to review patients' charts and adjust profiles.

Services to the Health Related Facility are adapted to meet the needs of residents who require institutional care to maintain a certain level of independence. The nursing department may administer medications to this group.

However, since the State code allows self-administration of medication with the attending physician's written permission, the Isabella Center initiated a program of self-administration of medication 10 years ago. This program is considered by the staff to preserve individual dignity and a degree of independence that should be acknowledged and nurtured.

The pharmacy receives a social history of each new admission. This preintroduction serves as a guideline for future observations. The members of the pharmacy staff attempt to establish a personal relationship with each of the residents. Only 4 out of the Health Related Facility's 207 residents do not qualify for self-administering medications; these patients are served in a private consultation room and their prescriptions are filled while they wait. The self-administering residents have medication boxes with clearly marked use and location information. Each resident has a profile card indicating: 1) if any duplicate prescriptions have been noted; 2) if any drug interactions have been observed or anticipated due to the medication; 3) the label and date; 4) type of sleeping medication in use, if any; 5) synopsis of diagnosis, and how it is reflected in the medication selected; and 6) a notation to retrieve containers.

The Isabella Home Skilled Nursing Facility is for aged persons in need of continuing nursing supervision and medical care, primarily residents who can no longer manage in the intermediate facility. The system used to administer and monitor medications in the Skilled Nursing Facility is a modification of the traditional bulk-drug floor stock system. This modified system uses a specially designed cart with space for drugs, recordkeeping, and storage of order sheets and profiles. The profiles for each patient are reviewed every 30 days, although there is an automatic "stop order" time for prescriptions. The carts are replenished by the pharmacy with precounted medications. The doctor reviews the patient's chart on his rounds; the pharmacist checks the medication order sheet and records the information on the patient profile record.

The John Rawlings and Associates Service Approach

John Rawlings and Associates is a pharmacy service firm that serves nursing homes. Rawlings and Frisk (1975) report on the model program they have applied in three nursing homes, using a centralized unit-dose delivery system based on the model developed by Beste at Providence Hospital in Seattle. The system is characterized by pharmacy review of the physician's original order, a medication profile sheet, a 24-hour cabinet exchange system featuring individual patient drawers, and a nurse's medication record. The services program revolves around the pharmacy services committee, which was generated as a result of Federal regulations governing skilled nursing facilities. The basic activities are:

- Taking in orders from the attending physician and compiling a medication history and profile for a new patient;
- Dispensing drugs;
- Monitoring and evaluation of drug storage;
- Monitoring of drug regimens every 30 days, with notes on irregularities continuously entered into the patient profile;
- Interprofessional relationships (the nurse practitioner working under the supervision of a physician is allowed to alter the drug therapy of certain medication classes);
- Establishing an adverse drug reaction reporting procedure, including the use of phone calls and adverse reaction report forms, that keep the physician notified of conditions; and
- Provision of written quarterly reports of pharmacy services provided, as mandated by Federal regulations.

The pharmacist providing these services believes that the cost for the pharmacy service, the average number of medications taken by each patient, and the medication cost per patient have all been substantially reduced through the implementation of this model.

The Nursing Home Demonstration Project (NHDP)

Responding to recent Federal regulations for nursing homes (which stipulate basic patient care and services, including expanded clinical pharmacy functions), Devenport and Kane (1976) developed a program of integrated patient care and education. The program uses a primary care team composed of a nurse practitioner, a social worker, a physician, and a clinical pharmacist.

The Department of Family and Community Medicine at the University of Utah College of Medicine established the Nursing Home Demonstration Project (NHDP), described by Kane et al. (1974).

Although all 13 homes involved in the project continued to obtain drug orders from their local pharmacies and the State hospital (for those patients followed by the community mental health centers), the NHDP clinical pharmacist was involved in five major areas of drug use: 1) initial drug review for each patient; 2) monitoring drug therapy; 3) providing drug information; 4) inservice education; and 5) patient counseling.

Each home was visited by the nurse practitioner and social worker at least once a week. The physician and pharmacist were consulted on problems of patient management. Therapeutic problems were discussed with the recommendations approved by the physician in the areas of 1) drugs of choice; 2) therapeutic efficacy; 3) bioavailability; 4) dosage; 5) contraindications; 6) potential drug interactions; and 7) adverse effects.

The Nursing Home Demonstration Project suggests that the Federal requirements for a pharmacist in nursing care facilities can be met, and that measurable improvements in the area of rational pharmacy and skill of nursing home staff can also be achieved.

Monitoring Training Programs and Materials

In the majority of cases, innovative monitoring schemes have been designed by researchers in pharmacy and public health. Concern for the monitoring of drug use as an integral component of health care has lead to the development of training workshops and explanatory manuals by pharmaceutical associations. These not only describe an appropriate protocol for monitoring the use of drugs, they also attempt to inculcate in pharmacists a sense of awareness concerning sources of drug abuse, the symptoms that may be produced by the particular problem, and the appropriate strategy to take regarding medication.

California Pharmaceutical Association Monitoring Course

In the syllabus for a course on drug monitoring in long-term care facilities, the California Pharmaceutical Association (CPhA) identifies strategies for alleviating drug misuse. Steps to be taken include the following:

- View all patients as potential drug misusers. Compliance is unpredictable. The level of knowledge concerning drugs possessed by the patient should not be overestimated.

- Look for risk factors that may contribute to drug misuse: a) patient characteristics--physical, psychological, and social factors that affect the patient's ability to comply; and b) patient perceptions and expectations--failure to comprehend the seriousness of the illness, the importance of therapy, consequences of noncompliance, and misuse of over-the-counter drugs.

- Disease characteristics: lack of symptoms makes proper treatment difficult.

- Characteristics of the drug regimen: inadequate instructions of drug labeling; complexity of multiple drug therapy; cost of the medications; and untoward effects (i.e., unpleasant taste or adverse effects). Also, there is a greater risk of noncompliance in treatments of long duration.

- Patient education can improve compliance.

- Maintain comprehensive patient records.

Recent legal precedents have established that both the physician and the pharmacist are responsible for informing the patient of the risks of the drug. Written instructions may be more effective than verbal warnings, since they accompany the medication and the patient. A patient should know: a) the name of the medication; b) the appearance of the medication; c) the general purpose of the medication; d) the method of administering it; e) the timing and frequency of administration; f) the maximum daily dose of the drug; g) how long to use the medication; h) pertinent side effects and cautions; i) early symptoms of serious adverse effects (without causing the patient undue concern and potential noncompliance); j) other drugs, food, or activities (such as driving) that should be avoided; and k) the proper storage and handling of the drug.

California Pharmaceutical Association Long-Term Care Monitoring Workshops

Since January 1974, when the final regulations for Skilled Nursing Facilities (SNFs) were published in the *Federal Register*, there has been a significant effort by the California Pharmaceutical Association and the trade journal *California Pharmacist* to acquaint the pharmacist-provider with his/her expanding role. Their activities have included a series of workshops and a workbook on monitoring drug therapy in the long-term care patient with psychogenetic disorders.

The syllabus was written for the Department of Health, Education, and Welfare under a contract between the California Pharmaceutical Association and the Office of Long-Term Care, U.S. Public Health Service, Region IX. The workbook focuses on drug therapy for patients with psychogenetic disorders and discusses the tools and methods of effective drug regimen monitoring. The workbook reinforces the pharmacist's knowledge of the characteristics of major psychogenetic problems found in the long-term care patient (e.g., anxiety, endogenous depression, chronic brain syndrome, exogenous depression, and acute brain syndrome). The workbook also tests the pharmacist's knowledge of recommended dosages of particular psychoactive drugs, such as diazepam, chlordiazepoxide, haloperidol, flurazepam, amitriptyline, and phenobarbital. The learning objectives of the workbook also include improving the ability of pharmacists to recognize the normal limits and potential significance of abnormal findings, as relates to drug therapy, for a series of laboratory tests. There is information in several other areas, including recognizing commonly occurring and potentially injurious adverse effects of psychoactive drugs in aged long-term care patients, recognizing the mechanisms associated with acute brain syndrome in the elderly, the merits and disadvantages of the use of certain drugs as hypnotics, and the means of improving the quality (safety, efficacy, and compliance) of drug therapy in aging patients.

The workbook and the associated workshops attempt to increase the skill of pharmacists, thereby reducing the misuse of psychoactive drugs in the older patient. The issue of implementation remains, however, since monitoring processes are not common and have yet to be mandated.

Health Resources Administration

The Health Resources Administration of HEW has also funded research and training in monitoring drug therapy of the long-term care patient. A major contract with the American Pharmaceutical Association involved extensive pharmacy training for nurses (HSM 110-73-421 1975). The purpose of this project was to expand the quality and scope of training offered by State and local pharmaceutical associations and schools of pharmacy to personnel involved with pharmacy services in nursing homes, and to offer a curriculum to schools of pharmacy to provide similar training to student pharmacists. Sixty programs were carried out under the contract. Of the 2,127 participants, 95 percent were pharmacists. The project included the development of a drug monitoring approach and protocol. In addition, a workbook for pharmacists was written, "Monitoring Drug Therapy of the Long-Term Patient" (American Pharmaceutical Association 1975).

DRUG UTILIZATION EVALUATION PROGRAMS

Drug utilization studies are another way to observe and review drug prescriptions of patients in long-term care facilities. Where monitoring of drug use is an ongoing in-house activity performed by resident or consulting pharmacists, such studies are either mandated by the State or are part of an extended project to collect data on patterns of drug use. Examples of protocols for review of drug use and the gathering of data on patterns of drug use are described below.

Kabat, Martilla, and Stewart Protocol

Kabat et al. (1975) designed and evaluated drug utilization review protocols (format) to be used by review committees in conducting the medical care evaluation studies (commonly referred to as sample studies) required by Federal regulations. The protocols are designed to contain all the information necessary to help the long-term care facility perform drug utilization review sample studies and to explain, in detail, the criteria found on the abstract sheet.

The drug utilization review process, however, provides only a general view of drug use patterns in institutions and often fails to remedy inappropriate drug administration practices. The reasons for this are: a) a patient requiring individual scrutiny may be treated as part of the larger group of patients, whose medication requirements for the same drug may vary; and 2) the committee's norms, criteria, and standards may not be stringent enough to insure remedial action on the part of resident physicians and consultant pharmacists.

Review of drug use, which is mandatory in all skilled nursing facilities certified for participation in the Medicare and Medicaid programs, includes medical care evaluation studies to promote the most effective and efficient use of available health facilities and services.

A DUR Committee in a skilled nursing facility, studying the current use of a psychoactive drug to determine if medication errors of interactions with other drugs are being ignored, would first determine what constitutes proper use of the drug. The committee then would compare patient medication records with the criteria for proper use and examine any discrepancies. Problem areas might be identified, such as physicians' carelessness in prescribing, a pharmacist's oversight during the monthly regimen review, or failure to perform necessary laboratory tests. The committee could suggest corrective measures, such as educational programs for physicians and pharmacists. A followup study is performed to determine how effectively the problem has been dealt with and whether further investigation is required.

Bureau of Quality Assurance Drug Evaluation Protocol

The Bureau of Quality Assurance of HEW's Public Health Service has published drug evaluation protocols, several of which concern the evaluation of psychoactive drug use. Medical appraisal norms (statistical measures of observed drug performance) are generated and medical care criteria are established.

Boston Collaborative Drug Surveillance Program

The Boston Collaborative Drug Surveillance Program in operation in 23 hospitals, uses trained nurses and pharmacists to perform daily monitoring, recording, and compilation of data on drug use among hospitalized patients (Allen and Greenblatt 1975). Monitors conduct structured interviews with newly admitted patients, collecting vital statistics and a medication history. A medication sheet is used to record all prescribed medication, therapeutic indications for each drug, the date the drug is started, and its dose, route, and frequency of administration. Medication changes are recorded, as well as the total amount of the drug consumed and the observed effectiveness of the treatment. When a medication is discontinued because of drug interactions, a special form is completed.

The Boston Collaborative Drug Study Program processes information from each hospital once a month. The data have been the basis for 80 publications over the past 10 years on such subjects as patterns and factors influencing the toxicity of drugs, drug-attributed adverse reactions, and clinical factors affecting adverse drug reactions and interactions.

At some of the hospitals involved in the Collaborative Drug Surveillance Program, the information generated is used to effect changes in individual drug regimens. This is the case in the program at the Arizona Medical Center (Trinca et al. 1975). At this hospital, the pharmacist involved in drug monitoring provides a link between the prescribing physician and the Department of Pharmacology by presenting difficult management problems at pharmacology rounds attended by physicians and students. By this means, drug surveillance is an educational tool for both students and physicians.

The PAID Program

The PAID Program is an example of retrospective intervention through utilization review. Patients covered by the Title XIX Medicaid Program in North Carolina have had their drug consumption monitored through a program operated by the PAID Prescriptions Company (specialists in prescription drug claim-processing) under contract to the North Carolina Department of Social Services and modeled on a program in California (Yarborough and Laventuries 1974; Hull et al. 1975).

Six pharmacists and a physician from each of four geographical regions meet once a month to review computer printouts of drug purchases. Local physicians and pharmacists are informed of unnecessary and inefficient drug use by a letter of inquiry, and they receive copies of recipients' drug profiles. This system has brought about a reduction in costs to the State and Federal Governments. Although many factors are not reflected in the prescription claims data, potential therapeutic problems can be identified; for example, a computer printout of medications purchased by outpatients in the California program indicated that 7.5 percent of drugs taken by 42,000 patients could have caused adverse reactions resulting in medical problems.

In their article on the PAID Program, Hull et al. (1975) cite four types of drug problems that can be revealed by patient profiles: prescription and therapeutic duplication; overutilization; drug interactions; and noncompliance. DUR committees have been able to identify problems in the first three of these areas, but noncompliance is apparently detectable only in hospital environments. The DUR committee has focused on drug reactions with anticoagulants because they are widely prescribed to Medicaid patients and interact with many other drugs, particularly barbiturates (Starr and Petrie 1972). The program has immense practical application for the evaluation of psychoactive drug use among older persons, and can effectively address some of the drug use problems that do not require an in-depth knowledge of the individual patient's physiologic characteristics.

SUMMARY

The five types of programs described in this section--improved diagnostic procedures, improved prescription controls, improved drug administration procedures, drug prescription monitoring, and drug utilization review--indicate a trend toward the development of more rational use of drugs, both psychoactive

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and nonpsychoactive. There still remains, however, a significant potential for abuse by the individual who does not comply with the drug regimen, even when it is correctly prescribed. This source of variance lies with the individual and must be addressed through other means, such as education or therapy, depending on the motivation for the particular pattern of use. The following section provides examples of how the processes of diagnosis, prescription, administration, and monitoring of drug use can be supplemented through interventive programs within the community and institutions.

PROGRAMS DESIGNED TO INTERVENE IN PSYCHOACTIVE DRUG MISUSE AMONG THE ELDERLY

Psychoactive drug misuse by the elderly has only recently been recognized as a significant public health problem. Because the incidence and prevalence of psychoactive drug misuse by the elderly are not yet well known, there have been relatively few policies designed to offer intervention or treatment for those affected. The previous section described a predominantly preventative approach, although monitoring procedures also are capable of detecting misuse situations. Careful control of psychoactive drug applications, through clinical and community health services, will continue to be of significance in reducing the future incidence of certain categories of psychoactive drug misuse. However, there remain unidentified numbers of older persons who are suffering from one or more physical and emotional complications that center on, or are related to, psychoactive drug use and who have not received the attention they may require.

This section focuses upon the efforts made by various social and public health organizations to design interventions that specifically address psychoactive drug misuse problems found among the elderly. There are very few of these programs at this time although the number seems to be growing concurrently with the growth in awareness of the problem. Many of the established programs are extensions of preexisting programs for the treatment of alcoholism and the elderly alcoholic. In such programs, the intervention generally focuses on what is thought to be the motivating variable in the abuse phenomenon--social isolation, limited economic resources, and possible lifelong pathology that is associated with addiction to alcohol. Other interventions, however, do not operate with the same assumptions, and often treat misuse of psychoactive drugs by the elderly as an inadvertent response produced by lack of information, or some aspect of social pathology that may be experienced in later life. Many of the programs recently initiated do not propose any hypotheses concerning the misuse of psychoactive drugs by the elderly; rather, they are investigating the misuse problem while at the same time offering clinical corrective treatment and guidance, thus collecting data while rendering services.

This section presents brief descriptions of the objectives, therapeutic approaches, and activities of a number of established or recently developed programs. The programs discussed include outpatient facilities emphasizing outreach, referral followup and education; inpatient drug abuse treatment in hospital and nursing home settings; drug abuse components of mental health centers; education and counseling programs; peer counseling; and rational self-help therapy.

The first programs to be described are those operated in Minnesota. Minnesota was the first State to recognize that there were psychoactive drug misuse problems among the elderly. As part of the 1973 Governor's Bill for the Chemically Dependent chemical dependency intervention programs are offered to underserved populations, including blacks, Chicanos, women, adolescents, and the elderly.

Three programs have been initiated in Minnesota that offer a service component to the elderly with psychoactive drug misuse problems: the Hennepin County Alcohol and Drug Access and Intervention Unit (A.I.D.); the Ramsey County Senior Chemical Dependency; and the Ebenezer Society Intervention Plus programs. These programs, established independently from one another, follow similar models of service provision, centered upon processes of misuse identification, referral to (if needed) a detoxification center, participation in a mutual-assistance Alcoholics Anonymous model, and efforts to change lifestyle and drug consumption patterns.

The programs also include examples of referred treatment programs for those elderly requiring higher levels of intervention and/or medical supervision. Programs of this type include: the Northwestern Hospital Treatment Program for the Chemically Dependent; the Queen Nursing Home Alcohol Treatment Program, which treats psychoactive drug abusers; the Camellia House Nursing Home Treatment Program, which offers similar services; and the Bridgeway Center.

Other programs described vary in their interventive mode and organizational foundation. In Tennessee, a coordinated program investigating the drug phenomena, while offering treatment to the elderly, has been initiated by the Department of Mental Health and Mental Retardation and associated mental health centers. In Chicago, the Augustana Hospital offers health education, counseling, and a research program centering on drug use problems among the elderly. In New York State, the Broome County Drug Awareness Center has been the source of an extensive drug education program for the elderly, including a traveling "minicourse" for the aged designed to improve knowledge about drugs. The College of Pharmacy at the University of Minnesota has also designed a series of programs to be presented to the elderly in order to increase their knowledge of psychoactive drugs. In Florida, the THEE DOOR service organization offers a variety of centers and counseling programs for prevention of, and intervention in, psychoactive drug abuse situations among the elderly. The Institute for the Study of Aging in Florida has funded a program focusing on peer counseling in their Management of Drug Abuse Among the Elderly program. The University of Kentucky has initiated a research program to study drug use patterns in the elderly and the utility of rational behavior training in reducing chemical dependency. The National Institute on Drug Abuse is currently supporting the Center for Human Services, in their efforts to develop and disseminate educational material for the elderly.

PROGRAMS[1]

Hennepin County A.I.D. (Minnesota)

The Hennepin County Alcohol and Drug Access and Intervention Unit (A.I.D.) established a special outreach project in March 1973 to provide assessment, intervention, referral, and followup care for the chemically dependent elderly in Hennepin County, Minnesota. The A.I.D. organization initially became involved with the chemically dependent elderly following requests by social workers, who had been receiving complaints from the residents of public housing projects concerning the disturbing behavior of intoxicated older residents. Intervening A.I.D. staff would often find the individual half-dressed, with bottles of pills on the cupboard or dresser, cans of opened food spoiling, and wastebaskets full of liquor bottles.

The A.I.D. program hired a chemical-dependency counselor whose main responsibility was to assist the A.I.D. director in developing an outreach program to train volunteers in assisting the intervention and followup processes of the special project.

The general program structure consists of six activities related to the objectives of access, intervention, referral, and followup for the chemically dependent elderly:

- The immediate call for help, either directly from the older person or through a referral, is handled by the A.I.D. Special Program Counselor.
- Intervention is handled by the counselor and a volunteer; the team approach is favored.
- Evaluation of the client is performed by the project counselor, with the assistance of A.I.D. staff members.
- Diagnosis of chemical dependency or other disorders requiring treatment is followed by a referral to an appropriate service agency--a hospital or nursing home detoxification center, drug treatment center, or other special program. Two outreach volunteers are available to assist the client to the appropriate treatment facility.
- Followup contact is maintained by the special program counselor, with the assistance of the volunteers. The followup program involves the chemically dependent person in growth groups modeled after those used in the treatment of alcoholics and drug addicts.
- Improved social functioning is measured by comparison of current and former behaviors.

Eleven satellite offices have been developed in the Minneapolis area. Transportation is provided for the handicapped or physically disabled, especially during the winter months. A.I.D. also operates a 24-hour answering service and conducts home interviews. Program services are provided on a continual basis, progress notes are kept on all client contacts, and group attendance records are maintained.

Between March 1, 1973, and November 1975, the A.I.D. program served 620 clients; 251

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[1] Addresses and contacts are listed in appendix B.

men and 97 women are actively involved in the therapeutic groups, several of them volunteering their services. Other clients listed as inactive still receive followup contacts; half of this group shows improved social functioning, while others are active in AA-type groups and aftercare programs.

Since November 1975, the program has provided a series of informational seminars emphasizing the prevention of drug dependency. It also provides information on alcoholism and drug problems in high-rise residential settings, as well as information on health centers, homemaker programs, and other services for the aged.

Ramsey County Senior Chemical Dependency Program (Minnesota)

Services provided by the Ramsey County Senior Chemical Dependency Program include prevention, intervention, counseling (both individual and group), transportation, client advocacy, aftercare, followup consultation, and education.

The program also acts as an advocate for clients who have been denied detoxification and medical treatment, possibly resulting in prolonged hospitalization and/or premature entrance into nursing homes or board-and-care units.

Ebenezer Society (Minnesota)

The Ebenezer Society serving older men and women, has recently initiated a chemical-dependency program called Intervention Plus. This program is designed to reduce drug misuse among the elderly of Hennepin County. The focus of the program is on outreach, evaluation, early intervention, nonresidential treatment, referral, followup, aftercare, coordination with other agencies, prevention, consultation, and education.

Northwestern Hospital (Minnesota)

Northwestern Hospital in Minneapolis operates a treatment program for chemically dependent patients referred to the hospital from detoxification centers, other hospitals, doctors, families, and the Hennepin County A.I.D. program.

Most arriving patients have been detoxified, but some require detoxification treatment. The program provides hospitalization and treatment for as long as 28 days, with possible extension of up to 2 weeks longer based on the evaluation of patient response at the end of the first 28 days. The program takes place in an age-integrated ward of the hospital, which the program director believes facilitates social interaction and leads to more improvement among the older patients. Each patient is given a comprehensive physical and psychiatric examination on arrival and again at the time of discharge.

Program activities include three lectures daily on educational and therapy-oriented topics. Among the topics discussed are: adverse drug reactions, drug interactions, individual differences in physiology, and the problems of noncompliance, deliberate overuse, the potential misuse of over-the-counter drugs, and the Alcoholics Anonymous approach.

The program also offers individual consultation with trained chemical-dependency paraprofessionals to ease the clients' emotional problems and to determine their service needs. At the end of the 28-day period, a client is evaluated and judged ready to leave, and he or she is referred to Alcoholics Anonymous groups and/or to other service agencies for aftercare. A patient who requires still further treatment may remain for an additional 2 weeks. If s/he continues to require care and treatment after that time, s/he is referred to a local nursing home with a chemical-dependency program, or to the Hennepin County A.I.D., which will assist him/her in finding appropriate services and placement.

Queen Alcohol Treatment Program (Minnesota)

The Queen Alcohol Treatment Center is representative of the small number of existing programs in nursing homes for the chemically dependent and physically or mentally impaired elderly. It was designed to treat the chronic alcoholic and chemically dependent older person. It maintains a 24-hour nursing staff and an 8-hour-a-day counseling staff for older persons who could not benefit from other programs because of significant physical and/or mental disorders related to past chemical abuse, and who have a medical disorder that is complicated by chronic alcoholism.

The initial effort of the program is toward physical improvement and an increased awareness of one's feelings. The focus is then broadened to include recognition and acceptance of living problems, and the importance of setting and achieving goals. Counseling and involvement in industrial and recreational therapies are also emphasized. Although the program emphasis appears to be on treatment of alcoholism, the staff are of the opinion that their treatment approach is also suitable for the elderly psychoactive drug abuser.

Upon admission to the program, clients are withdrawn under medical supervision from all mood-altering chemicals, with the exception of major tranquilizers prescribed for certain psychiatric disorders. In these cases, however, the patient is still evaluated for possible discontinuation, in order to assess the chemical dependence and treatment plan.

Prior to discharge, the client is required to join an AA chapter and complete the AA orientation program. If the patient needs vocational training, he is enrolled in an outside training program to acquire the desired skills. Housing arrangements are also made at this time. Followup contact, monthly or more often, assures the patient that he is welcome at the clinic at any time.

Camellia House (Minnesota)

One-third of the facilities at Camellia House nursing home are devoted to treating the chemically dependent patient. This is the second such home in Minnesota, and, like the Queen Alcohol Treatment Program, the goal is to establish and maintain patterns of living free from chemical dependency. The low-profile program at Camellia House is designed to overcome the feeling that treatment is associated with punishment.

The chemical-dependency program is geared to slower paced elderly patients and patients with temporary or permanent physical or mental disabilities. The program incorporates Alcoholics Anonymous program steps, group therapy, individual counseling, and educational lectures. Group therapy involves supportive confrontations directed toward encountering defense systems modifying behavior, and replacing the delusionary system with realistic awareness. Gestalt therapy is used as the basis for identifying and accepting the illness so that the patient can "come to grips with the conflict between values and behavior" with the discovery or rediscovery of himself as a thinking and feeling person. Weekly attendance in the AA group is required as part of group therapy.

Bridgeway Center (Minnesota)

The Bridgeway Center is a multidisciplinary chemical-dependency unit, operating in a facility under the ownership of King Care Centers, Inc., a private health care corporation. The program provides intervention services for the chemically dependent elderly and for other age groups. The program offers 30-day primary and extended care treatment programs that are oriented toward treatment of the physical, mental, and emotional illnesses of the chemically dependent person and that provide one-to-one counseling and participation in group therapy.

At the end of the first 30 days, the client is evaluated and is either discharged or assigned to the continued care or the extended care program. The latter program lasts another 30 days. The program is designed to permit physical as well as mental recuperation. While the Northwestern program refers the patient to another program at the end of 6 weeks, the Bridgeway program attempts to carry out necessary treatment and rehabilitation within 2 months. If the client has not recuperated within that time, the patient is referred to a nursing home, such as the Camellia House.

State of Tennessee

In October 1976, representatives from four Tennessee mental health centers and three sections of the Department of Mental Health and Mental Retardation of the State of Tennessee met to plan a statewide program that addresses the problems of drug and alcohol abuse among the elderly. The mental health centers represented were Joe Johnson Mental Health Center in Chattanooga, Overlook Mental Health Center in Knoxville, Dede Wallace Mental Health Center in Memphis, and the University of Tennessee Mental Health Center. Together with representatives from the Geriatric Services Section, the Alcohol and Drug Abuse Section, and the Public Affairs Section of the State of Tennessee Department of Mental Health and Mental Retardation, they set the following objectives:

- To increase public awareness of alcohol and drug problems among the elderly, and to familiarize the public with resources and services available.
- To develop strategies and begin efforts to coordinate existing services.
- To develop specific plans and investigate the need for new programs and services.

Program planning is a cooperative venture, involving each of the participating agencies and mental health centers. In addition, the University of Tennessee Mental Health Center is conducting group sessions to deal with drug-related problems of the elderly; Overlook Mental Health Center is developing a screening process to detect alcohol and drug abuse problems; and Joe Johnson Mental Health Center is collecting data on the drug and alcohol problems of the over-60 population in their catchment area.

Augustana Hospital (Illinois)

Augustana Hospital in Chicago operates a program of health education, instructing elderly hospital patients in the effects and proper use of medications. It was soon noted, however, that the use of drugs within the hospital fostered dependency and made it difficult for the patients to benefit from the education program, which stressed independence. This realization resulted in a broadening of the program, which now addresses problems related to the independent functioning of senior citizens. Eleven health education topics have been developed: medication safety, the heart, high blood pressure, stress, laxatives and bowel preparations, analgesics and antibiotics, diabetes, consumer awareness, eye care, arthritis, and nutrition. Public attention has also been brought to the problems of the elderly through local television coverage and articles in a senior citizens' newspaper.

Medical counseling has been effective in building confidence in the health care system and encouraging greater use of these services.

A research program has been established to assess the health care needs of the elderly, to examine patterns of medication use, to evaluate the level and quality of services offered to the public by pharmacies, and to determine the factors contributing to noncompliance in medication use by the elderly.

Broome County Drug Awareness Center (New York)

The program model designed at the Broome County Drug Awareness Center attempts to provide the elderly with health care information, particularly with regard to the safe and effective use of drugs, and also to aid them in developing a behavioral program for themselves and significant others.

THEE DOOR (Florida)

THEE DOOR is a service organization in Osceola County, Florida, addressing drug abuse problems in all age groups. Their facilities and programs include the Alpha Center for education and prevention of drug misuse, a center for individual and family counseling; a Youth Development Center with an alternative school and a residential program; a methadone center; and a Substance Abuse Program. THEE DOOR recently initiated an outpatient counseling center specifically oriented toward misuse of prescription medication by the elderly (overdosage, duplication of prescriptions, swapping of medications, and use of outdated drugs).

In addition to its direct counseling services, the counseling center provides educational services designed to be as accessible as possible to the elderly, through the use of an outreach program conducted at community centers in residential areas.

In March 1977, THEE DOOR began a training program for service providers to the elderly. Direct service workers (visiting nurses, county welfare workers, social and economic services workers, nursing home personnel, and others) participated in the training sessions. Training modules, with workbooks and cassette tapes have been developed for dissemination to other programs. In addition, the program has developed guidelines for the creation of a task force of elderly persons, to advise social service agencies and increase the effectiveness of referrals.

A Peer Counselor Approach (Florida)

"Management of Drug Abuse Among the Elderly: A Peer Counselor Approach" is a program organized by the Institute for the Study of Aging at the University of Miami, on behalf of 30 agencies in Dade County, Florida. It provides services to elderly persons identified as heavy users of drugs.

Drug use problems are attributed both to lack of information and to sociopsychological problems arising from isolation, physical disability, and economic difficulties. Intervention consists of the training of elderly persons as peer counselors, a method that has been effective among younger persons in both the prevention and the treatment of drug abuse.

Older Life Drug Experience Research Project (OLDER) (Kentucky)

OLDER is a demonstration research program operating out of the Department of Psychiatry, University of Kentucky Medical Center, designed to study effectiveness of rational behavior therapy in the treatment of drug misuse problems among the elderly. The program operates under the hypothesis that learning an emotional self-help technique can enable the older person to cope with stresses of aging without the use of tranquilizers and nonprescription drugs. It is also hypothesized that these self-help techniques are best taught by laypersons rather than by mental health professionals, a belief that is supported by the success of such groups as Alcoholics Anonymous, etc.

This program also provides a systematic, factual, drug counseling effort designed to influence patterns of drug use. A 3-year research project will evaluate the effectiveness of this approach.

SUMMARY

The variety of programs now in existence to meet the problem of psychoactive drug abuse among the elderly suggest that the nature of and solution to the problem are not yet known. Evaluations of these existing programs are not yet available, and there are few guidelines against which the programs can be measured.

CONCLUSIONS

Programs addressing the problem of psychoactive drug misuse among the elderly fall into two broad categories: monitoring of drug use and intervention programs.

PROGRAMS THAT MONITOR THE DIAGNOSIS, PRESCRIPTION, AND ADMINISTRATION OF DRUGS

Considerable attention has been focused on the issue of more accurate diagnosis of psychiatric disorders in the elderly. This concern is centered on pairing a correctly diagnosed disorder with the most effective treatment, resulting in a decreased likelihood of incorrect or needless medication.

Increased physician awareness of the significance of accurate diagnostic procedures and appropriate therapeutic interventions for the aged has led them to recognize the role that individual physiological and psychological differences play in drug response. Consequently, physicians have developed formal and informal protocols to identify the correct drug for a given patient. They also have developed strategies adaptable for insuring correct drug administration and compliance. These include guidelines for selecting psychoactive drugs for the elderly and for determining the optimal quantities, duration, and structure of the drug regimen.

The increased volume of drug prescription and use, and the consequent increase in adverse reactions--due to drug/drug and drug/individual interactions--have provided an incentive for pharmacists and physicians to develop programs to monitor and evaluate drug consumption.

Interest on the part of Professional Standards Review Organizations has also promoted development of systematic methods of medication profile review and troubleshooting. With the growth of an extended pharmacy role in community health maintenance, and the increased availability of computer-operated monitoring systems, opportunity for encouraging appropriate or reduced use of psychoactive drugs in the elderly is enhanced.

PROGRAMS DESIGNED TO INTERVENE IN PSYCHOACTIVE DRUG MISUSE AMONG THE ELDERLY

The increase in public awareness of psychoactive drug use problems among the elderly has led to the creation of new intervention programs, designed strictly to serve the elderly drug user. These programs fall into five categories:

- Outreach and referral
- Hospital and nursing home treatment programs
- Educational programs in combination with another intervention such as health care, therapy, or a social activity
- Peer counseling
- "Rational" behavior training

There are at present, few active programs in the area of specific interventions and treatments for the elderly psychoactive drug user, other than the examples reviewed in this document, several of which originate in one State--Minnesota.

TRENDS

Several observations can be made concerning trends in the provision of services to prevent or intervene in psychoactive drug misuse among the elderly.

A Rational Approach to Prescription and Administration

There is an apparent trend to develop a more "rational" approach to the application and dispensation of psychoactive drugs that affect the elderly. This is manifested primarily in the development of enhanced information systems for use by physicians in prescribing medications; in the development of prospective monitoring and retrospective use studies; and in the increased role of health professionals in guiding and reviewing the prescription and use of drugs.

Improved prescription and monitoring systems will have a greater impact on the elderly drug users when three conditions are met: a) when the protocols for drug monitoring are used more universally and consistently;

b) when monitoring programs develop prescription criteria that take into consideration both the physiology and socioemotional status of the elderly consumer; and c) when drug/drug and drug/person interactions are considered in prescription. At the present time, very few pharmacies are capable of monitoring drug consumption in the community. This problem is complicated by the fact that drug consumers can move from pharmacy to pharmacy, and can obtain multiple prescriptions from different physicians. The need for centralized information in monitoring drugs must be seriously considered and evaluated in terms of the potential savings in lives and health care costs, as well as in terms of the issue of medication profile confidentiality. Should comprehensive drug monitoring systems be implemented, with guidelines for correct use and safeguards for privacy, the aged person will share the same benefits as other drug consumers.

Direct Intervention Programs

There is a growing interest in developing programs for direct intervention in psychoactive drug misuse by the elderly.

At the present time there are two major program thrusts: the first is toward identifying the drug misuser and placing him/her in contact with treatment resources and followup care; and the second is in the area of drug-use education. Many program developers are of the opinion that drug misuse in the elderly is attributable to lack of information as well as to emotional difficulties. The outreach programs recognize these factors, but the more immediate concern is with the existing cases of misuse that require immediate treatment. Patterns of future drug intervention for the aged may attempt to synthesize the identification component of the outreach programs with innovative therapeutic interventions and service referrals, followed by continuing education programs. Peer counseling and education will doubtless play an important role in all programs.

The most disconcerting aspect of the trend in development of drug interventions for elderly psychoactive drug misusers is the lack of central information clearinghouses where health care professionals can make contact and share their design concepts and service problems, as well as gather information on the aged. A second point of interest is the lack of contact between service providers in the field of direct intervention and pharmacists interested in promoting drug monitoring activities. Further interaction between those prescribing and dispensing drugs will facilitate more effective program interventions and alternatives for elderly psychoactive drug misusers. The U.S. Department of Health, Education, and Welfare Task Force on Prescription Drugs (1969) reported that at that time, over $3 billion a year was being spent to correct adverse response to therapeutically adminstered drugs. It is probable that the aged represent a significant portion of the population requiring corrective therapy for drug problems. Therefore, the personal and public savings to be derived from an integrated approach to monitoring and intervening in psychoactive drug use are apparent.

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- The Drug Spotlight Program was established by the American Society for Clinical Pharmacology and Therapeutics in order to help hospitals develop policies and set standards appropriate to drug therapy that comply with the recommendations of the Joint Commission on Accreditation of Hospitals. This hospital-based continuing education program has both a national and a local hospital phase. The program's National Advisory Committee, comprised of its member organizations, is responsible for the national phase. This entails selecting the drugs that will be spotlighted, providing scientific papers that center on them, and publishing questions about their use that merit consideration at the local hospital level. For a 3-month period a drug or class of drugs will receive Spotlight attention. Relevant current information will be presented in scientific papers appearing in the following participating member group journals: American Family Physician, American Journal of Hospital Pharmacy, American Journal of Nursing, Annals of Internal Medicine, Journal of American Medical Association, and Patient Care. A videotape program will be offered by the Network for Continuing Medical Education consisting of a variety of viewpoints presented by numerous experts. The above publications as well as others of the participating organizations will, during the first month of each presentation, announce the upcoming drug subject for spotlighting, along with the questions to be considered. The local phase is planned to be carried out by each hospital's committee on pharmacology and therapeutics. A question relating to the spotlighted drug is chosen for study and its answer sought by gathering and analyzing data from hospital records. This important phase ends with its participants drawing conclusions and presenting them to the hospital staff.

Amin, M.H. Drug treatment of insomnia in old age. Psychopharmacological Bulletin, 12:52-54, 1976.

- It is estimated that 55 percent of persons over age 60 suffer from some degree of insomnia. The intensity of sleep processes is known to diminish with advancing age, and stage IV sleep in a 60-year-old is less than half that experienced at age 20. REM time begins to decline, while awake time in bed increases. Brain deterioration accompanying aging, regardless of its cause, is associated with greater disturbances in sleep. Treatment of insomnia with anxiolytic sedatives is made difficult and dangerous in part because of the likelihood of physical dependency on the barbiturates and also because of the longer half-life and period of percepto-motor as well as cognitive deficits associated with benzodiazepine use. These agents, during the first few weeks of administration, successfully increase stage II sleep and REM latency; but chronic use causes increased latency to sleep, increased number of awakenings, frequent stage shifts, continued suppression of REM sleep, and a dminished stage IV sleep. Withdrawal from these drugs produces unpleasant symptoms such as jitteriness, nervousness, difficulty in falling asleep, and fragmented sleep. An increased state I REM, i.e., REM rebound, and intensified REMs also occur during withdrawal, the rebound being dangerous because vegetative tone increases during REM sleep. Cardiac arrhythmias, anginal attacks as well as substantially increased acid secretion in duodenal ulcer patients occur with greater frequency during a REM period. Drugs such as the benzodiazepines, that particularly decrease slow wave sleep, only complicate the hyperthyroidism and uremia-associated insomnia that itself reults from decreased slow wave sleep. Meprobamate in doses not exceeding 800 mg, chloralhydrate at 500 mg and flurazepam at 15 mg, if administered for no longer than 2 to 6 weeks, are the best choices in instances where hypnotic use is absolutely unavoidable for elderly patients. Flurazepam, a benzodiazepine, does cause a reduction in slow wave sleep without REM rebound upon withdrawal. The hypnotic chloralhydrate decreases sleep latency and awake time while increasing total sleep time. Meprobamate possesses certain hypnotic properties. Small dosage levels of chlorpromazine (25 mg) or levomepromazine (10 mg) may have to be administered during the recommended gradual withdrawal period.

Bender, A.D. Pharmacodynamic principles of drug therapy in the aged. Journal of the American Geriatrics Society, 7:296-303, 1975.

- This paper presents a review of research concerning the functional, physiological, and pathological changes associated with increasing age and the pharmacologic aspects of aging. The discussion is oriented both to the effect of age on systems and events that influence the drug's concentration at its site of action and the age-related changes that affect systems and tissues directly or indirectly influenced by the drug's mechanism of action. Such factors as drug absorption, drug distribution, drug excretion and metabolism, and the effect of age on the activity of drugs are discussed. Among the findings reported are:

  > Absorption of some substances is reduced or delayed in the elderly.
  >
  > Changes in drug activity with age are the result of impaired circulation and membrane permeability.
  >
  > The rate at which drugs are metabolized and eliminated is decreased.
  >
  > Changes in the number of receptors and concentration of substrate occur, thereby reducing the action of stimulants and enhancing the action of depressants.

  This paper is directed toward the prescribing physician and emphasizes that fact that there may be an altered response in elderly and debilitated patients that requires adjustment in the patient's therapeutic regimen. (There are 72 references.)

Benson, R.A., and Brodie, D.C. Suicide by overdoses of medicines among the aged. Journal of the American Geriatrics Society, 23:304-308, 1975.

- The authors indicate that drugs rank third, after firearms and hanging, in suicide. Prescription drugs are used in one of three suicides in the United States. The elderly are prone to suicide because of failing health and diminished life satisfaction. The older white male, in particular, is called upon to adjust to income and status loss at a time when he is least able to adapt. The rate for suicides in this group exceeds that for all other combinations of age, sex, and race. Depression is often the only early clue or warning sign in a group whose attempts are almost always serious.

  Prescriptions for hypnotics and psychotherapeutic drugs are readily available to the elderly. Barbiturate hypnotics accounted for over 20 million prescriptions filled in America during 1973; half of these were ordered for hypnotic purposes. The barbiturates an elderly insomniac consumes can actually produce or intensify any existing tendencies toward depression or suicide, particularly if combined with alcohol consumption.

  Although there is evidence that the prescribing of barbiturates is slowly decreasing, the death rate per million prescriptions is on the rise. The prescribing physician is caught in the bind of deciding whether to make psychotropic drugs available to elderly patients, thus providing an easy means of suicide, or to withhold these drugs, leaving the patient alone in his struggle with depression and an often accompanying wish for death. Further complicating this dilemma is the difficulty surrounding the estimation of what constitutes a lethal dose of these drugs. It is suggested that elderly patients must be assessed on an individual basis by the prescribing physician so that treatment can be varied according to the patient's overall status.

Birkett, D.P., and Boltuch, B. Psychotropic drugs in old age. The Journal of the Medical Society of New Jersey, 70:647-648, 1973.

- Birkett and Boltuch conducted a study on the effects of psychotropic drugs on aged persons. Thirty psychogeriatric unit patients over age 65 participated in an open crossover study of the side effects of three antipsychotic drugs: thioridazine, chlorpromazine, and haloperidol. These subjects were not already stabilized on a psychotropic drug, their mental symptoms were more extensive than memory loss or confusion, they had no history of adverse reactions to phenothiazines, and they were free of any liver disease indications. Patients were not given phenothiazine-, butyrophenone-, or thioxanthine-type drugs during the week prior to the study. Ten patients each were then randomly assigned to three treatment groups where they followed study drug regimens for nine consecutive evenings. Each drug was administered separately for three consecutive evenings in the following amounts: haloperidol, 0.5 mg, 1 mg, 2 mg; thioridazine, 25 mg, 50 mg, 100 mg; and chlorpromazine, 25 mg, 50 mg, 100 mg. The above schedule was assigned to one of the groups while the other two followed schedules of either taking thioridazine first and then haloperidol and chlorpromazine, or of being administered chlorpromazine followed by thiroidazine and haloperidol. There were no significant differences between drugs in the severity of side effects they produced and none was particularly free of these problems. Both systolic and diastolic blood pressure fell most on thioridazine and least on chlorpromazine. Rigidity and unsteadiness on the feet were greatest on haloperidol, drowsiness was the most prominent on chlorpromazine, and tremor on thioridazine. No falls or accidents occured over the 9-day study period.

Boyd, J.R., et al. Drug defaulting. Part II: Analysis of noncompliance patterns. American Journal of Hospital Pharmacists, 31:485-491, 1974.

- Forty-two outpatients age 65 and over were included in a study of noncompliance with prescription instructions at an Oklahoma City teaching hospital. Pertinent information was gathered during patient home interviews within 7 to 10 days following a clinic visit where prescriptions were administered. A total of 380 prescriptions were written for the 134 participating patients, ranging in age from under 24 to 65 and over, of whom more than three-fourths were over 45 years old. Patients 65 and over received 107 prescriptions compared to the 63 patients age 45 to 64 who received 184. In all cases the association between comprehension and compliance was statistically significant (p=0.05). The 45 to 64 age group had the highest level of comprehension, significantly higher (p=0.05) than the lowest, age 65 and older, group. The 45 to 64 age group also had the smallest number of errors per prescription (p=0.001). The greater number of errors in the elderly population was attributed to a combination of more complex health problems and decreasing capacity for self-care.

Clinite, J.C., and Kabat, H.F. Prescribed drugs ... Errors during self-administration. Journal of the American Pharmaceutical Association, NS9:450-452, 1969.

- Thirty male outpatients ranging from 21 to 90 years old were interviewed about their prescription medication administering habits approximately 1 week after leaving a Veterans Administration hospital. Increasing age was not a factor in medication errors since patients over 70 had the lowest error rate. It was possible that they had more time than younger patients to carry out their therapeutic regimens correctly, and this may have accounted for their greater accuracy.

Covington, J.S. Alleviating agitation, apprehension, and related symptoms in geriatric patients: A double-blind comparison of a phenothiazine and a benzodiazepine. Southern Medical Journal, 68:719-724, 1975.

- In order to compare the efficacy of a phenothiazine (thioridazine or Mellaril) with a benzodiazepine tranquilizer (diazepam or Valium) in relieving geriatric apprehension and agitation, 40 senile, but nonpsychotic, nursing home patients were used as subjects in a 4-week, double-blind study. Patients were randomly assigned to treatment groups where 20 were administered diazepam and 20 received thioridazine in daily doses adjusted to each patient's need. These ranged from 10 to 80 mg of thioridazine, with a mean of 32.9 mg, and from 4 to 18 mg of diazepam, with a mean of 7.2 mg. Patients were evaluated before the study and at weekly intervals with a modified Hamilton Anxiety Rating Scale and a Modified Nurses' Observation Scale for Inpatient Evaluation (NOSIE). Global ratings were also made before and during the study of the degree of both illness and overall change.

  A pretrial versus week-4 comparison based on the Hamilton Scale showed that thioridazine reduced the severity of all eight items more than diazepam, with significant reductions for the anxious mood and depressed mood items (p=0.10 or more). Thioridazine significantly reduced the severity (p=0.05 or better) of four of the eight items, but the diazepam group showed no significant reductions. A greater percentage of the thioridazine group (23 to 45 percent) than the diazepam group (15 to 30 percent) showed at least some improvement on each item. Time response trends differed, and significantly so (p=0.05 or better) for four items, with the thioridazine group generally showing a pattern of steady symptom improvement compared to a more erratic and less positive pattern in the diazepam group.

NOSIE results showed that after 4 weeks only thioridazine had significantly reduced the frequency of retardation (p=0.10) and this group had experienced more improvement on every factor, significantly more so (p=0.05 or better) on five of nine factors. Their time responses were significantly different (p=0.10 or better), favoring thioridazine for depressive manifestations and total positive factors. Separate global ratings by a physician and by nurses at the end of 4 weeks each showed a significant reduction (p=0.5 or better) in the degree of mental illness along with significant improvement (p=0.05 or better) in the degree of change in thioridazine patients, with a comparative significantly greater improvement (p=0.05) in these patients for both ratings. Worsening in these two ratings had occurred in the diazepam patients. No serious side effects of clinically significant changes in either vital signs or laboratory test results were found in either set of patients.

Davison, J.R.T., et al. Psychotropic drugs on general medical and surgical wards of a teaching hospital. Archives of General Psychiatry, 32:507-511, 1975.

- A 6-week study of psychotropic drug use on the wards of a 480-bed university teaching hospital was conducted to examine the prescribing patterns of gynecologists, surgeons, and internists. One hundred twenty-eight patients, or 9.4 percent of all 1,361 admissions, were administered psychotropic medicine. Preoperative and postoperative hypnotics were not included. They were administered the most frequently by the department of medicine, to 14.4 percent of their patients, followed by surgery (8.9 percent) and obstetrics-gynecology (4.7 percent). A ratio of 1:1.09 men to women received psychotropic drugs compared to the total admissions population ratio of 1:1.37. The ratios of black patients to white were 1:1.93 and 1:1.75, respectively. Generally, patient's age was not a determinant of choice of drug. The mean age of men patients was 45.9 and 47.7 for women. The 30- to 65-year-old admissions, comprising 45 percent of total admissions, were overrepresented in the psychotropic group (67 percent), whereas the over-65 patients were 14 percent of the total 15 percent of the psychotropic groups. Minor tranquilizers were the most widely used agents (72 percent); major tranquilizers comprised 16 percent of the prescriptions; barbiturates, used only for seizure disorders, represented another 6.7 percent and antidepressants, 5.3 percent.

Davison, W.T.D. Pitfalls to avoid in prescribing drugs in the elderly. Geriatrics, 1975. pp. 157-158.

- The author's editorial was directed toward geriatricians and emphasized both the importance of reviewing the patient's complete drug schedule and the need for constant questioning of every drug on the patient's prescription list, when prescribing medication. One special problem discussed is polypharmacy that results in a bigger drug burden, an increased risk of adverse drug reactions, and decreased patient compliance. Guidelines suggested to insure maximal response with minimal risk include: full knowledge of the diseases present, an understanding of drug actions, selectivity in drugs, the simplest drug schedule, and adequate supervision.

De Groot, M.H.L. The clinical use of psychotherapeutic drugs in the elderly. Drugs, 8:132-138, 1974.

- De Groot's article indicates that general principles of drug administration for the elderly patient apply as much to psychotherapeutic as to other drug classifications. The ability of the aging system to absorb, and particularly to detoxify and excrete, drugs is reduced; therefore, it is wise for the physician to be knowledgeable about the pharmacological action, metabolic and excretive characteristics of proposed drug therapy. The lowest effective dosage level should be established for each elderly patient, and complicated, multiple-drug regimens are best avoided.

  Depression in the elderly patient is most effectively treated by the tricyclic antidepressants. A more pronounced sedative effect occurs with the use of amitriptyline, imipramine, trimipramine, and doxepin than results from using nortriptyline, protriptyline, and desipramine.

Initial low doses are recommended as hypotension can develop in elderly patients with unstable blood pressure. However, the action of adrenergic neuron blocking antihypertensive drugs can be antagonized by the presence of amitriptyline, imipramine, and derivatives. The tricyclic doxepin surmounts this problem if administered at the usual optimum dosage of 75 to 150 mg daily.

Atropine-like side effects can occur when these drugs are used along with other drugs possessing anticholinergic activity. Monoamine oxidase inhibitors are effective as antidepressants, but involve the dietary avoidance of foodstuffs rich in tyramine or dopamine and also the ingestion of preparations containing sympathomimetic amines. Only those elderly persons who are capable of remembering and carefully following instructions should be treated with these drugs. Elderly mania patients receiving lithium carbonate treatment require a lowered dosage due to their diminished ability to excrete the lithium ion. Use of barbiturates in these patients should be avoided as dependency is likely. The phenothiazines, although the most commonly used treatment in elderly schizophrenic patients, can produce extrapyramidal reactions that, particularly in older patients, are unresponsive to antiparkinsonian medication. Elderly endentulous female patients are particularly vulnerable to developing dyskinetic complications. Hypotension may occur in normotensive patients, and blood pressure control in hypertensives may be interfered with. The use of benzodiazepines or barbiturates in the treatment of anxiety in elderly patients can increase confusional states, thereby often increasing anxiety, creating dependency and even hostility.

Eisdorfer, C. Observations on the psychopharmacology of the aged. Journal of the American Geriatrics Society, 23:53-57, 1975.

- According to Eisdorfer, phenothiazines are currently the most widely used antipsychotic drugs. Side effects such as extrapyramidal motor signs, tardive dyskinesia, and akathisia are common. Difficulties are encountered in establishing a medical program for elderly psychotic patients. The acute stage of psychosis is best handled by commencing drug dosage at a low level, followed by a rapid increase up to an effective amount.

A chronic psychosis should be treated by using the lowest dosage level possible. A regime consisting of a single dose at bedtime along with no utilization over the weekend appears to maintain therapeutic effectiveness while diminishing unwanted side effects. The use of antiparkinson drugs to combat extrapyramidal side effects should be discouraged along with the administration of various psychotropic drugs from the same or even from different categories.

Psychotropic drug use in the elderly and in middle-aged, potentially chronic users should begin with a dosage level one-quarter to one-third less than the normal adult dosage and should gradually be raised according to individual tolerance. Side effects such as cardiovascular disorders, premonitory signs of glaucoma, or loss of libido should be watched for in elderly as well as in younger patients. Drug influence on cerebral circulation can make hypotension a particular danger for the elderly patient.

The aged are a population vulnerable not only to disease but to iatrogenic illness caused by both direct and indirect drug action. Although the elderly are more prone to drug induced side effects, clinical drug trials are usually conducted and dosage levels are developed based on results obtained from younger and healthier subjects. Older people have greater tissue storage of drugs due to a higher ratio of fat to muscle tissue, along with lower levels of metabolic function and a greater risk of metabolism related respiratory and renal systems diseases. The benefits of psychotropic drugs can best be realized in a program that includes a proper medical diagnosis formulated upon the patient's mental, emotional, and physical condition.

Fann, W.E. Interactions of psychotropic drugs in the elderly. Postgraduate Medicine, 53:182-186, 1973.

- Fann's article indicates that altered metabolism, blocked transport, altered excretion, altered mediator activity, and impaired gastrointestinal absorption may result from the multiple use of major psychotropic agents, particularly in the more vulnerable systems of older patients.

Liver microsomal metabolism of the anticonvulsant diphenylhydantoin, of tricyclic antidepressants, phenothiazines, and certain anticoagulants is retarded by the presence of methylphenidate, a mild central nervous system stimulant. When given to counter the sedative effect of a drug, it often increases sedation by blocking liver metabolism, thereby raising blood level of the sedative. Conversely, because the sedative phenobarbital accelerates liver microsomal metabolism in certain phenothiazines, warfarin, coumarin, and diphenylhydantoin, its use with a phenothiazine can lower that drug's serum level and reduce its clinical, including sedative, effect. The hypotensive effect of the antihypertensive drug guanethidine can be antagonized by the concurrent use of tricyclic antidepressants or certain phenothiazines. These drugs can prevent guanethidine from accumulating in the adrenergic neuron by blocking the activity of the adrenergic membrane transport system that would normally deliver it there. Since both depression and hypertension occur frequently in elderly persons, this interaction is a likely and dangerous one that physicians should be on the alert for, particularly in psychiatric outpatients.

Lithium therapy is useful in the treatment of cyclic affective disorders, but selective renal lithium reabsorption and toxicity can occur if the patient does not maintain a physiologically normal serum sodium level. Even though many elderly, cyclic affective disorder patients also have concurrent conditions demanding diuretic therapy, such treatment is contraindicated while lithium therapy is being administered.

Monoamine oxidase inhibiting compounds such as the antidepressant tranylcypromine and the anthypertensive drug pargyline, reduce intraneuronal breakdown of norepinephrine. These compounds potentiate the pharmacologic action of pressor amines, such as tyramine and amphetamine and its congeners, which in turn act to release the available norepinephrine.

Patients undergoing either of these treatments should be warned against eating certain tyramine-rich foods or ingesting sympathomimetic amines such as amphetamines, often available in over-the-counter cold remedies. The physician also must be careful not to prescribe such combinations as they can produce a hypertensive crisis. Desired absorption of the major tranquilizer chlorpromazine from the gastrointestinal tract can be threatened by gel antacids containing magnesium or aluminum. Further research is needed pertaining to cholestyramine, a hypercholesterolemia treatment agent, and its ability to interfere with absorption of psychotropic agents.

Fann, W.D. Pharmacotherapy in older depressed patients. Journal of Gerontology, 31:304-310, 1976.

- According to Fann, treatment for depressive conditions is generically the same for various age groups although dosage levels should be initially low and more gradually increased in elderly patients. Tricyclic antidepressants are a better treatment choice than the Monoamine Oxidase (MAO) inhibitors because they are safer; although in severe geriatric depression tricyclics may be more effective. Both have a 1 to several weeks lag time before therapeutic efficacy is noticeable.

Tricyclics are particularly effective in treating endogenous-type depressions. Nonsedating tricyclics such as protriptyline and imipramine are well suited to treatment of retarded or withdrawn depressives whereas the sedating amitriptyline or doxepin are more appropriate cases of agitated or hyperactive depression. Certain tricyclic side effects such as twitching, tremor, ataxia, hypotension, dry mouth, and atropine-like effects are especially troublesome in elderly patients. Reduced liver metabolism makes them more vulnerable to glaucoma, urinary retention, orthostatic hypotension during early treatment, constipation, and a central atropine-like delirium often mistaken for an increase in psychiatric symptoms. MAO inhibitors are dangerous because of their hepatoxicity and potentiating effect upon pressor amines, the latter resulting in hypertensive crises. All sympathomimetic agents are contraindicated during their use. A lowered initial starting dose should range from 10 to 25 mg a day and increase by 20 mg in 2 to 3 days if no side effects are evident.

The antianxiety agent diazepam has a slight advantage over the others in its antidepressant action but side effects such as habituation, sedation, aggravation of glaucoma, diplopia, blurred vision, and withdrawal phenomena can occur. Of the neuroleptics, thioridazine possesses helpful antidepressant properties. Certain piperazine derivatives, such as perphenazine and trifluoperazine, can be useful in agitated depression when administered with tricyclics. They must be used with care in the treatment of any underlying psychoses accompanying depression. Elderly patients are particularly vulnerable to the acute neurotoxic and dyskinetic effects these drugs can cause. The parkinson-like syndrome is the most common. Late-onset hyperkinesis, or tardive dyskinesia is often irreversible, particularly in older persons with a history of treated psychosis.

Central nervous system stimulants are mainly helpful in cutting down tricyclic therapy lag time, but they can increase depression-related anorexia and induce short-lived mood elevation which is followed by severe emotional decline. Possible cardiovascular side effects make them a poor choice for elderly patients. Lithium is effective only in prophylaxis of endogenous depression and should not be used to treat reactive depressions. A lowered renal lithium clearance in elderly patients necessitates a careful monitoring for lithium toxicity.

Multiple system decompensation in elderly persons leads to a greater likelihood of their receiving multiple drug prescriptions. They are at greater risk for the occurrence of dangerous or treatment-impairing drug interactions. Many of the antidepressant agents, when used in combination with other drugs, can either block the transport of other drugs to their site of action, alter the excretion rate of the other drugs, alter their mediator activity, or interfere with their absorption from the gastrointestinal tract.

Fann, W.E.; Wheless, J.C.; and Richman, B.W. Treating the aged with psychotropic drugs. The Gerontologist, 16:322-328, 1976.

- The diagnosis and treatment of mental disturbances in the elderly are usually either incorrect or incomplete in nature. Insufficient attention is paid to the fact that chronic brain syndrome (cbs), or senility, is only one psychiatric disorder occurring in this population. Functional psychoses, affective disorders, and neuroses are as likely to be found in the elderly as they are in other age groups. When psychotropic drugs are applied to a cbs-diagnosed elderly patient and some improvement follows, it is not due to any real change in brain tissue function but rather to a beneficial effect upon other present psychiatric conditions.

When late paraphrenia develops in the elderly patient, it is important to distinguish whether it is caused by chronic brain syndrome or whether it accompanies a depressive state. Only chronic brain syndrome paraphrenia should be treated with antipsychotic medications. The phenothiazines are the most frequently used because of their ability to reduce symptomatic intensity in agitated, delusional, and hallucinating senile patients. As patients over age 65 have a great reduction in their ability to metabolize antipsychotic drugs, a lowered initial dosage level is not only adequate but far safer than levels administered to patients under age 65. Potential side effects due to physiological accumulation include dry mouth, urinary retention, constipation, nasal congestion, aggravation of glaucoma, drowsiness, lethargy, hypotension, and extrapyramidal symptoms. The elderly are especially vulnerable to the development of tardive dyskinesia, a syndrome including involuntary choreo-athetoid movements of the face, mouth, tongue, extremities, and trunk muscle groups. Even after medication withdrawal these symptoms may continue for an indefinite period, even becoming permanent in some instances. The use of phenothiazines in the particularly susceptible aged population can lead to a vicious circle of prescribing higher dosage levels to counteract what are actually drug-induced states of confusion and delirium.

Depression in elderly patients is most often treated by lowered starting doses of tricyclic antidepressants. Elderly persons who are restless and agitated receive the type which includes a sedative. Older patients with retarded depression are treated for the secondary problems of hypoactivity and hypomentation with a nonsedative tricyclic agent. Due to the 2- to 4-week lag time before results are apparent, these drugs are more useful in mild to moderate depression. They also possess potentially dangerous atropine-like and antiadrenergic actions. The inherent toxicity of monoamine oxidase inhibitors and their ability to potentiate pressor amines, along with the action of several unrelated drugs, e.g., anesthetics, barbiturates, adrenal coricosteroids, ganglion blocking agents, morphine, atropine, and 4-amino-quinoline compounds, causes them to be used less frequently. Also, the antidepressive and hypotensive effects of MAO inhibitors are potentiated by diuretics. However, the effectiveness of MAO inhibitors in the treatment of geriatric depression may still prove promising as elderly depression and the aging process itself are correlated with high MAO activity. Stimulant compounds are unpromising as antidepressants as their beneficial effects disappear quickly, drug tolerance or dependence is likely to occur, and they have potent pressor effects.

Numerous sedative, muscle relaxant, or anticonvulsant compounds have been clinically effective in treating anxiety in elderly patients. Chlordiazepoxide (Librium), a benzodiazepine, is frequently used due to its relative safeness. These agents can produce dependency and withdrawal symptoms which unfortunately mimic the onset of psychosis in elderly patients. Glaucoma can also be an unwanted side effect. Rauwolfia alkaloids possess some value as anxiolytics, particularly when blood pressure or pulse rate reduction is desirable, but gastrointestinal bleeding may occur along with other unwanted side effects. The use of any anxiolytic agent is very likely to cause a secondary clinical depression, especially in patients who have a history of affective illness episodes.

Fracchia, J., et al. Combination drug therapy. Journal of the American Geriatric Society, 13: 508-511, 1975.

- Data were gathered for a typical month on the most frequently used psychotropic drugs in 278 male and 624 female long-term, hospitalized psychogeriatric patients aged 60 years and over. T-tests were conducted to ascertain the significance of mean dosage differences for drugs used separately and in combinations. For females the use of 11 drugs was compared. The average multidrug dosage of 10 agents was higher than the single-drug dosage. It was significantly higher in four drugs: fluphenazine (Prolixin) and chlorprothixene (Taractan), t=2.95 and 2.78, p=.01; and thiothixene (Navane) and perphanazine (Trilafon), t=1.98 and 1.96, p.10. The average single-drug dosage of haloperidol (Haldol) was insignificantly higher than its average in combination. Only five drugs were compared for male patients, but the same general trend was in evidence. The average multidrug dosage of chlorpromazine (Thorazine) was significantly higher than the single-drug dosage (t=2.71, p=.01).

Greenblatt, D.J.; Shader, R.I.; and Koch-Weser, J. Psychotropic drug use in the Boston area. Archives of General Psychiatry, 32:518-521, 1975.

- The Boston Collaborative Drug Surveillance Program conducted interviews with 25,258 consecutively admitted patients aged 20- to 75-years-old during the first 10 months of 1972 to determine their use of prescribed psychotropic drugs prior to hospitalization. Patients with primary psychiatric diagnoses, those with psychogenic disorders, and those unable to identify drugs taken were excluded, leaving a population of 24,633 patients. Patients who were taking an identifiable antidepressant, antianxiety agent, antipsychotic, hypnotic, or stimulant were considered psychotropic drug users. Of the 24,633 patients analyzed, 5,079 or 20.6 percent reported taking a psychotropic drug at least once in the 3-month period prior to their interview. Women used these drugs more frequently than men (25 percent versus 15 percent), and use was highest in the 50 to 59 age group (women, 28 percent; men, 17 percent). The lowest female users were age 20 to 29 (19 percent), and 70- to 75-year-old and 60- to 69-year-old females were the second and third lowest, respectively (20 percent and 24 percent). The lowest male users were also age 20 to 29 (9 percent), and 70- to 75-year-old and 60- to 69-year-old males were the second and fifth lowest, respectively (12 percent and 16 percent).

Harenko, A. A comparison between chlormethiazole and nitrazepam as hypnotics in psychogeriatric patients. Current Medical Research and Opinion, 2:657-663, 1975.

- The hypnotic effects of chlormethiazole and nitrazepam were compared in a double-blind crossover study of 68 hospitalized demented elderly patients, averaging 77 years of age with a range of 62 to 91 years. Medications, consisting of two tablets nitrazepam 5 mg = 10 ml placebo mixture (syrup) and two tablets placebo = 10 ml chlormethiazole 5 percent mixture (syrup), were crossed over on alternate weeks. Six patients dropped out completely because of side effects or the manifestation of diseases, and 18 patients had to interrupt medication for 1 to 3 days. Twenty-one interruptions or discontinuations occurred during nitrazepam treatment, of which 15 were due to severe "hangover" effects. Two patients refused to take chlormethiazole because of its foul taste. Six of the forty-four uninterrupted cases experienced side effects, five of whom had muscular weakness, nausea, and worsening mental condition.

Over the 308-night test period, no significant differences pertaining to onset of sleep were noted in the 44 patients. Sleep more frequently lasted over 6 hours a night during chlormethiazole treatment, a significantly higher difference of 244 out of 308 nights compared to 163 out of 308 nights during nitrazepam treatment (x^2=46.35, p 0.001). Also, significantly more patients (36) were observed with "hangover" effects during nitrazepam treatment than during chlormethiazole treatment (2). A 10-mg dose of nitrazepam was judged to be at least two times higher than necessary for use in elderly patients. Excluding the 6 patients who dropped out, an overall judgment of suitability for 62 patients resulted in 37 cases assessed as faring better with chlormethiazole, 11 cases with nitrazepam, and 14 cases who could do equally well with either one.

Ingman, S.R., et al. A survey of the prescribing and administration of drugs in a long-term care institution for the elderly. Journal of the American Geriatrics Society, 13:309-316, 1975.

- On August 1, 1971, a survey was made of the prescribing and administering of drugs in a Connecticut nursing home as it pertained to residents. Primary focus was on the use of neuroactive drugs--anxiolytics, neuroleptics, antidepressants, psychostimulants, hypnotics, analgesics, skeletal muscle relaxants, antiparkinson drugs, autonomic agents, and cerebral stimulants in--severely brain-damaged persons, ambulatory and relatively self-sufficient residents, extended care unit patients, and recently hospitalized patients.

  Doctors prescribed an average of 2.1 neuroactive drugs per patient but only an average 1.3 was administered. Analgesics and neuroleptics were prescribed the most frequently; phenothiazine derivatives (43 cases) and salicylates (37 cases) were the particular drugs most commonly prescribed.

  Of the total 272 neuroactive drug prescriptions, 131 were actually administered, 145 were prescribed on a discretionary (p.r.n.) basis, and 96 (66 percent) of the p.r.n. group were not administered. Patients with relatively superior mentation and a greater measure of independence were prescribed significantly more neuroleptic substances (i.e., single chemical entities) and neuroleptic drugs than were patients with lower mentation and a greater amount of dependency ($p < .05$). There were 23 prescriptions for propoxyphene compound, a not-recommended drug by AMA Drug Evaluation standards. Fifty-four patients (41 percent) received prescriptions for fixed-dose combinations of drugs, which are frowned upon as an illogical drug therapy procedure. Variations in prescribing patterns among physicians were evident even when records of physicians with approximately the same number of patients were compared.

  When the average number of all drugs prescribed on August 1, 1971 (4.9±6.3), was compared with the average number prescribed on October 1, 1970 (5.8±3.17), a significant average decline of 0.8 drug prescribed per patient had occurred ($p < .001$). The decline was subsequent to the implementation of the JCAH recommended monthly rewriting of drug orders. A decrease of 0.14 p.r.n. drug occurred as well as a decrease of 0.27 fixed drug per patient. However, there was an increase in the number of drugs received per patient, rising from an average 2.55 (SD=2.3) to an average 2.9 (SD=1.4) drugs per patient. These results are based on the records of 112 patients who were in the nursing home on both dates.

Kral, V.A. An overview of psychopharmacology of old age. Psychopharmacology Bulletin, 12: 51-52, 1976.

- The functional psychoses, i.e., endogenous depressions, manic states, and the schizophrenic late paraphrenias, are the mental disorders of the aged most benefited by psychopharmacological treatment. Due to lessened metabolic efficiency and likely concurrent organic disease in these patients, the smallest yet effective dosage level of psychotropic drugs should be administered and the prescribing physician should be aware of all simultaneously prescribed drugs so as to avoid harmful drug interactions. Combinations of psychotropic drugs should be used only after each drug has been introduced separately to assess tolerance.

Tricyclic antidepressants and the monoamine oxidase inhibitors are both used to treat endogenous depressions and must be administered at individually established levels. The therapeutic effects of tricyclics appear from 4 to 21 days after initial treatment, and administration should continue until all target symptoms show definite improvement. A gradual tapering off is required, and a reduced maintenance dose for several months is often necessary.

Central nervous system side effects, such as ataxia, somnolence, and lassitude, occur with equal frequency in aged and younger patients. It is still questionable whether the drugs' anticholinergic action or an age-linked stress reaction is the causal agent in an acute confusional state occasionally occurring in elderly patients. The antidepressive effect of MAOIs is rapidly apparent, causing mood improvement but no allaying until later, and sometimes temporarily increasing the experience of anxiety. Treatment with MAOIs contraindicates the use of anesthetics and incurs the risk of hypotension in users. Combining antidepressants with a neuroleptic to treat agitated depressions can result in accident causing orthostatic hypotension and cerebral vascular accidents. Side effects are potentiated by the combined anticholinergic actions of tricyclic and the phenothiazines.

Lithium carbonate, although a successful treatment for manic states, is contraindicated in patients with compromised renal, hepatic, cardiovascular, and thyroid function. Complete recovery will occur in 3 weeks without serious side effects if the proper dosage is established and continued and serum lithium levels are monitored frequently. Without either careful monitoring or cautious patient selection, tremulousness, drowsiness, confusion, and extrapyramidal signs will occur. Aged schizophrenic patients, whose treatment is very similar to that for younger patients, share the risk of developing a neuroleptic-induced Parkinson syndrome. Often occurring shortly after therapy commencement, it is sometimes preceded or accompanied by a peculiar restless state. Although very responsive to traditional antiparkinsonian medication, the combined anicholinergic action of both medications can produce an acute confusional state. Therefore the medication cannot be used in a preventive manner and its use should be discontinued a few weeks after initial awareness of symptoms. Tardive dyskinesia is a neuroleptic-induced side effect presenting serious treatment difficulties and warranting a discontinuation of medication when feasible. Depressive or paranoid episodes accompanying a dementing process are treatable with antidepressants and/or tranquilizers, but their side effects may be more troublesome in such cases. A superimposed state of acute confusion warrants treatment with a neuroleptic along with the infusion of glucose.

Lamy, P.P. Geriatric drug therapy. Clinical Medicine, 81:52-57, 1974.

- The elderly patient frequently suffers from a multitude of morbid conditions or diseases at a time in life when reserve functional capacity, energy metabolism, and enzymatic processes are greatly reduced. The capacity to absorb, distribute, metabolize, and excrete drugs is very often impaired, resulting in an increase of adverse drug effects. Persons aged 70 to 79 experience adverse drug reactions at a rate seven times greater than persons aged 20 to 29 years, and the rate for those aged 60 to 70 years is twice that for persons aged 30 to 40 years. Age-related reduction in gastric juice acidity, a slowed stomach emptying rate, and a reduction in intestinal blood flow can lead to a delay or reduction in drug absorption.

  Drug distribution can be affected by circulatory disturbances and the decreasing activities of several enzymes can hamper drug metabolism. Aging is accompanied by a decrease in kidney size, glomeruli, and tubule cells, and glomerular filtration rate, renal flow, and tubular secretion capacity fall below normal levels. Renal pathology and resulting diminished renal function is the norm in elderly persons, and water imbalance along with general metabolism imbalances are frequently found. Reduced peristaltic activity, leading to constipation and diarrhea can also alter the elimination of drugs, especially those which exhibit enterohepatic circulation.

  The establishment of drug dosage levels for the elderly patients is frequently accomplished by aiming at a uniform medium level which is often either too high or too low for at least half the population. There is no formula which can be followed for every patient, but the aim should be to arrive at the minimal effective dosage level. When prescribing antidepressants for elderly patients, lower than usual dosage levels are essential to avoid adverse reactions. Sedatives must be used with extreme caution in elderly persons. Barbiturates are generally contraindicated as they may cause severe and unexpected durg toxicity. A dependency liability is incurred with meprobamate and glutethimide use, and patients taking 20 or more tablets of the latter have a mortality rate of 45 percent. Paraldehyde, although unpalatable, is rapid, safe, and effective whereas chloral hydrate is a potential cardioinhibitor and a gastric irritant.

Elderly patients with arteriosclerotic cerebral vessels or chronic obstructive pulmonary disease should not be administered sedatives which depress cardiac or respiratory function, and the insomnia which can occur due to an overly full bladder should not be treated with sedatives. When a decrease in anxiety, psychomotor activity, hallucinations, and delusions is needed, large initial, followed by smaller, doses of the phenothiazines are helpful. However, neurotic reactions, simple endogenous depression, and acute disturbances are not benefited by them. Possible dose-related side effects of the phenothiazines are jaundice, agranulocytosis, dermatitis, and photosensitivity, besides a general tendency to cause a high rate of extrapyramidal reactions and hypotension. Potentiation of epilepsy and mental depression, lowered body temperature, and exaggeration of cerebral anoxia can also occur, as well as irreversible parkinsonian symptoms. The phenothiazines and also chlordiazepoxide and diazepam can depress thyroid function, and small doses of the latter two are required to prevent ataxia development.

Lamy, P.P., and Kitler, M.E. Drugs and the geriatric patient. Journal of the American Geriatrics Society, 19:23-33, 1971.

- A survey of drug prescribing patterns centered upon 33 geriatric cardiac patients in a teaching hospital, 30 ambulatory patients over age 65, and 30 patients over 65 admitted to a geriatric care hospital. Although all drugs prescribed were found to be administered within the range of recommended dosage levels, there was no general reduction made because of the patients' elderly status. Barbiturates, particularly in combinations, were frequently administered to the ambulatory patient, whereas hospitalized patients received chloralhydrate on the rare occasions when barbiturates were prescribed.

Lamy, P.P., and Vestal, R.E. Drug prescribing for the elderly. Hospital Practice, 1976. pp. 111-118.

- Social Security Administration statistics show that during 1974 the aged population spent about $2.26 billion, or more than 20 percent of the national total, on drugs and drug sundries even though they comprise only 10 to 15 percent of the total population. Including renewals, they averaged over 13 prescriptions a year per capita, spending close to $100 for prescribed and over-the-counter drugs. The mere factor of multiple drug use, even when correctly prescribed at proper dosage levels, involves a strong possibility of toxic reactions, and studies have shown that drug-induced illness occurs with much greater frequency among elderly hospitalized patients.

  Prescribing drugs for the elderly patient is both complicated and hazardous. Age-associated decrements in physiologic function as well as the effects of illness or trauma erase the reliability of the "average" dose for the "average" patient and require the physician to be able to weigh benefit and risk using a different set of parameters than s/he would apply to younger patients. Above all, s/he must approach the treatment of geriatric patients with a sense of caution accompanied by an awareness of knowledge that is available to help him/her formulate treatment regimens.

  Because much research must still be done in order to fully understand the effects of aging on pharmacokinetics, quantitative answers to specific problems of dosage and drug selection are not yet available.

Learoyd, B.M. Psychotropic drugs and the elderly patient. The Medical Journal of Australia, 1:1131-1133, 1972.

- The Medical and Psychogeriatric Unit of the North Ryde Psychiatric Centre of North Ryde, New South Wales, reviewed case notes for all 236 patients over age 65 who had been admitted during the past 2 years to learn how many admissions had been the result of psychotropic drug intoxication. Thirty-seven, or 16 percent, met the criteria of having been administered psychotropic drugs prior to admission and then developing disturbed behavior with or without physical symptoms. Further, in the Centre this behavior must have subsided when these patients were removed from drugs followed by a discharge on a much smaller drug regimen. When admitted, seven of these patients were suffering from simple drug intoxication, and their confused mental state had often led to self-administered overdoses. Sixteen patients had, in addition to the above, incurred secondary effects from drug intoxication such as hypotensive syncope, related falls and three fractures, respiratory depression and associated chest infections, and urinary retention or gastrointestinal ileus. The remaining 14 patients had reactions which manifested as restlessness, agitation, paranoia, and aggression. Multiple psychotropic drug therapy was the rule, as only four patients were administered on drug alone. It is postulated that these admissions were made necessary because of elderly patients' reduced tolerance to the combinations of drugs, and because of ignorance about the effects that lead to further medication and increasing deterioration. Although the association was not as clearcut, it was estimated that another 4 percent of the 236 patients had been admitted mainly because of drug effects. Study findings lead to the postulation that many elderly admissions to general hospitals are for illnesses precipitated by excessive use of psychotropic drugs.

McKenney, J.M., and Harrison, W.L. Drug-related hospital admissions. American Journal of Hospital Pharmacy, 33:792-795, 1976.

- In a 2-month survey and analysis of the association between hospital admissions and drug-related problems there were a total of 216 admissions to a general medical ward, of which 59 (27.3 percent) were linked in some manner to drug usage. Seventeen percent of all patients were age 60 to 69, and 19 percent were age 70 or over. Their representation in the drug-linked admissions population, 15 percent and 11 percent, respectively, was not significantly different, nor was that of all other age groups. The age group 40 to 49 had the highest representation and comprised a quarter of the subpopulation. Adverse drug reactions (7.9 percent) and noncompliance (10.5 percent) seemed to be the major precipitating factors in hospital admissions for these 59 patients. Another 24 (11.1 percent) of the 59 patients had adverse drug reactions, but they did not cause their admission. Inadequate thereapy, improper or erroneous drug use and drug overdose had a somewhat weaker association with hospital admission.

Merlis, S. The use of oxazepam in elderly patients. Diseases of the Nervous System, 36:27-29, 1975.

- Oxazepam is a particularly effective and safe benzodiazine medication for use in elderly patients because of the following properties and characteristics: efficient absorption patterns, rapid metabolism to a psychopharmacologically inactive substance, favorable biotransformation characteristics, a wide margin of safety, and beneficial excretion patterns. Other characteristics surrounding its limited potential drug interactional effects with other therapeutic agents contribute to its efficacy without increased side effects. Earlier studies of oxazepam use in several hundred institutionalized geriatric subjects showed significantly superior overall results in reducing anxiety and tension occurring alone or anxiety concurrent with depression when compared with patients receiving another drug or placebo. In doses averaging 30 to 50 mgs daily, side effects were less prevalent than with other treatments, and vertigo, sedation, and nausea appeared less frequently. Some inhibition of hostility and aggressive behavior was evidenced, and paradoxical reactions, which sometimes occur with chlordiazepoxide use, rarely happened. Ambulatory noninstitutionalized elderly patients have also shown a high tolerance of oxazepam. It is useful in elderly patients who have sleep problems such as early awakening or restlessness at night. It possesses a short duration of action and at proper dosage levels there is no sedative or hangover effect in the morning.

Petersen, D.M., and Thomas, C.W. Acute drug reactions among the elderly. Journal of Gerontology, 30:552-556, 1975.

- Data were gathered for 60 persons age 50 and over who were admitted to a Dade County, Florida, hospital emergency room because of acute, nonfatal drug reactions during 1972. Ranging from 50 to 80 years old and averaging 59.6 years, they comprised only 5.4 percent of the total 1,128 overdose admissions whose average age was 27.6 years. Females outnumbered males (68.4 percent versus 31.6 percent) in the aged group and were more concentrated in the aged group than in the total population (68.4 percent versus 58.6 percent). Blacks comprised only 15 percent of the aged admissions compared to 33 percent of the total admissions. For both the aged group and all admissions, white females were the race/sex grouping most likely to be admitted, comprising 61.7 percent of aged admission and 38.4 percent of all admissions.

  Comparisons with 1970 Dade County census data showed that although the aged group was not overrepresented in total county emergency room admissions for acute drug reactions, over age 50 females (68.7 percent versus 55.3 percent) as well as white, over age 50 females (61.7 percent versus 51.4 percent). Similarly, blacks exceeded their Dade County distribution (15.0 percent versus 7.2 percent), black males (8.3 percent versus 3.3 percent) slightly more than black females (6.7 percent versus 3.9 percent). Aged admissions, though more likely to have reported multiple substance use prior to acute drug reaction (31.9 percent versus 23.5 percent of all admissions), were less likely to report alcohol use (8.3 percent versus 10.9 percent). The proportion of the aged group reporting their overdose as an attempt at suicide (35.0 percent) was only slightly greater than the 33.7 percent reported for all admissions.

  Legally available drugs, whether attainable by prescription or over the counter, were responsibile for all admissions among the aged group. The particulars of attainment were not available. Of every 10 of these drugs, 8 were psychotropic, either sedatives or tranquilizers, and one was a nonnarcotic analgesic. In descending order, Valium, Tuinal, phenobarbital, and Darvon were the most frequently abused. Among the aged group, whites and females were more likely to have overdosed on tranquilizers, sedatives, and nonnarcotic analgesics. Twenty percent of the admissions under age 50 had abused illicit substances.

Rada, R.T., and Kellner, R. Thiothixene in the treatment of geriatric patients with chronic organic brain syndrome. Journal of the American Geriatrics Society, 14:105-107, 1976.

- Forty-two hospitalized geriatric patients (21 male) with chronic organic brain syndrome (24 nonpsychotic) were randomly assigned to treatments in a double-blind, placebo-controlled 4-week study of the efficacy and safety of thiothixene (Navane) treatment. The mean age was 75.5 years, and duration of illness averaged 5.3 years. Demographic characteristics and the chronicity of illness did not significantly differ between the thiothixene and placebo group. Using a starting dosage of 2 mg three times daily during the first two weeks, which could then be increased to 5 mg three times daily, produced virtually no statistically significant improvement in the thiothixene group. The few side effects which occurred were mild in nature and developed in only seven thiothixene patients, compared to six placebo patients who experienced side effects.

Salzman, C., et al. Psychopharmacologic investigations in elderly volunteers: Effect of diazepam in males. Journal of the American Geriatrics Society, 13:451-457, 1975.

- Forty healthy elderly male volunteers over the age of 60 participated in a 2-week, double-blind study of diazepam (DZ) during which 20 were randomly assigned to a group receiving 12 mg of DZ daily and 20 received placebo (PBO). Various psychological scales and motor functioning tests were administered and mean change scores for both groups, statistically compared by t-test, were obtained by subtracting predrug ratings from 1-week and 2-week scores.

  Data were available for 38 patients. Overall analysis of significant results suggests that an increase in fatigue and decreases in memory and motor functions are produced by a daily 12 mg dose of DZ. After the 2-week period results from a revised MMPI depression scale showed a significantly higher number (9) of the 18 DZ recipients reporting decreased depression scores compared to only 2 of the 20 PBO recipients (p=.02).

Salzman, C., and Shader, R.I. Psychopharmacology in the aged--Research considerations in geriatric psychopharmacology. Journal of Geriatric Psychiatry, 7:165-184, 1974.

- The evaluation of drug effect in the elderly centers around the research problems of biologic variability, age, gender, dose, toxicity, polypharmacy, placebo effect, initial severity of symptoms, capacity to respond to drugs, and age-related problems of rating drug effect. Biologic and physiologic functioning among elderly persons who are the same chronological age can vary greatly according to the number and severity of chronic diseases and pathological processes present at any one time. This lack of biologic homogenity is a threat to the validity of research results unless given due consideration in research program design.

  Various psychotropic drug studies utilizing elderly subjects have found a differential response to treatment occurring in males and females, as well as in relatively younger and older aged subjects, suggesting that it is important to conduct a separate data analysis by gender and age so that these intrasample findings are revealed rather than cancelled out and overlooked in a total sample analysis. There is also evidence for a need to conduct separate treatment data analyses of patients who exhibit either high or low initial levels of symptoms.

  Findings from numerous studies suggest that patients exhibiting a high level of the target symptom or symptoms will show the greatest improvement following drug therapy, and an examination of only the overall "mean" drug effect can act to cancel out these variations. Elderly subjects are likely to be patients on various multiple drug regimens which are capable of affecting the action of psychotropic drugs. Also, elderly persons have a heightened sensitivity to the sedative side effects of psychotropic agents which may result in hampering their clinical efficacy. The elderly are also particularly vulnerable to potential extrapyramidal and hypotensive side effects caused by many antipsychotic and antidepressant drugs.

  It is wise for the researcher to establish dosage guidelines and learn of potential toxicity through a small preliminary pilot study. He should also be aware that high placebo response rates are common among attention-starved, elderly subjects, and one study's results suggest that it increases with the presence of psychopathology, institutionalization, and age. Any marginally greater improvement with active drug treatment over that with placebo is worthy of attention.

  The choice of rating scales to use for evaluation of drug effects in geriatric populations must be made with the variability of elderly subjects in mind. Although rating a relatively healthy and cooperative geriatric patient is similar to rating younger populations, there still exists a reduced attention span and a decreased tolerance for ambiguity. Very few scales have been designed especially for geriatric patients in the areas of behavioral, mood, and cognitive function rating.

Salzman, C., and Shader, R.I. Responses to psychotropic drugs in the normal elderly. In: Psychopharmacology and Aging. New York: Plenum Press, 1973. pp. 159-168.

- One hundred health volunteers over the age of 60 participated in a 1-week, double-blind study of mood-altering drugs administered in typical doses. Twenty-five subjects each were randomly assigned to treatment groups where they received either 2 mg t.i.d. of diazepam, 15 mg t.i.d. of phenobarbital, 5 mg t.i.d. of methylphenidate or a placebo three times each day. Psychological scales were administered before and after the study period, and the Bonferroni multiple comparison test was used to analyze mean change scores for the entire sample and for each sex. Each active drug was compared independently against placebo. Few statistically significant results were found. Diazepam showed a significant overall trend toward increasing both friendliness and fatigue and had a significant antidepressant effect on males. In females, diazepam and methylphenidate both significantly increased friendliness over placebo. Methylphenidate was found to be the best antidepressant and antianxiety agent for females, whereas diazepam was the more effective drug for males.

Salzman, C.; Shader, R.I.; and Van Der Kolk, B.A. Clinical psychopharmacology and the elderly patient. New York State Journal of Medicine, 76:71-77, 1976.

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- Alterations in somatic functioning that occur due to the aging process can change the clinical and toxic effects of drugs or other agents. Changes in the gastrointestinal tract slow down and impair drug absorption and cause increased atropinergic sensitivity. The aging cardiovascular system can reduce or delay drug circulation and cause increased sensitivity to orthostatic stress. Albumin fraction is decreased in the aging hematopoietic system.

  In the nervous system a decrease in neuronal tissue causes an increased sensitivity to clinical and toxic effects and also to side effects produced by the cholinergic blocking properties of certain drugs, such as neuroleptics and antidepressant agents. These drugs commonly cause blurred vision or a dry mouth, and the loosening of porcelain dental fillings is not unusual. Symptoms accompanying glaucoma or benign prostatic hypertrophy may be aggravated. Decreased gastrointestinal and bladder motility are less common, but possibly dangerous, side effects.

  Potentially serious cardiovascular side effects can result from use of certain neuroleptics. Phenothiazines and the structurally related tricyclic antidepressants can cause occurrences of orthostatic hypotension, particularly in susceptible older persons with elevated blood pressure and resultant decreased elasticity of the arterial wall. Older people with impaired cardiovascular functioning are also more predisposed to arrythmia, a further side effect of both phenothiazines and tricyclic antidepressants.

  Central nervous system disturbances are particularly prevalent in elderly neuroleptic users. Sedation, paradoxical excitement, delirium, dementia, assaultiveness, delusions, and hallucinations also occur with greater frequency in elderly patients taking psychoactive drugs. As no neuroleptic is free from side effects, and their clinical efficacy is about equal, choice of treatment should be based on knowledge of their differential production of sedative, hypotensive and extrapyramidal side effects, and the treatment needs and overall condition of each elderly patient. Tricyclic antidepressants are also approximately equal in effectiveness. Except for the risk in very old patients of producing severe hypotension or arrythmias, they are preferred in the treatment of elderly depression. They have potentially serious side effects, and they interact with many of the medical drugs that older persons commonly are administered.

  The benzodiazepines are currently considered the drug treatment of choice for anxiety in both young and old patients. Elderly patients are more susceptible, however, to sedative side effects, making these drugs suitable for the treatment of mild insomnia as well. The hypnotic flurazepam as well as chlorpromazine or thioridazine in small doses is also extremely useful and safe. Generally, elderly patients should not be treated with babiturate and nonbarbiturate sleeping medications other than the benzodiazepines. Polypharmacy should be avoided as much as possible in order to prevent dangerous drug interactions.

Synder, B.D., and Harris, S. Treatable aspects of the dementia syndrome. Journal of the American Geriatrics Society, 14:179-184, 1976.

- Detailed case histories are presented of four geriatric patient referees to a general hospital from long-term care facilities due to the exhibiting of behavioral disturbances. The diagnosis of untreatable dementia was incorrect for two of these patients, one who had been administered five psychoactive drugs concurrently before hospital admission. The case histories illustrate the importance of proper diagnosis and exemplify improper, incomplete, and unsafe treatment as well as high-quality care which is thoughtfully planned and delivered with the individual patient in mind. The point is made that everything possible should be done to help both dementia, otherwise behaviorally impaired, demented and nondemented patients maintain their maximum level of overall health and independence.

Swanson, D.W.; Weddige, R.L.; and Morse, R.M. Abuse of prescription drugs. Mayo Clinic Proceedings, 48:359-367, 1973.

- A study was made of 225 patients ranging from 16 to 77 years old whose abuse of prescription medicines caused them to need inpatient psychiatric treatment between July 1, 1966, and July 1, 1972. Mean patient age was 45 years and 123, or 55 percent, of patients were females. Patients were categorized by the drug they abused into a sedative, analgesic, tranquilizer, stimulant, or miscellaneous grouping. The distribution by age decades and by sex was fairly even excepting that significantly more females (18) than males (6) had abused tranquilizers ($p < 0.05$), and the mean age of stimulant abusers was only 34.3 years, their ages ranging from 21 to only 53 years. The age at onset of drug abuse ranged from 14 to 73 years with a mean of 36.5. The duration of abuse ranged from 6 months to 35 years, and averaged 12.5 years. More patients abused sedatives and analgesics than the other categories.

APPENDIX A

RESEARCHERS INVOLVED IN PSYCHOACTIVE DRUG USE BY THE ELDERLY

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APPENDIX B

PROGRAMS SPECIFICALLY DESIGNED TO INTERVENE IN PSYCHOACTIVE DRUG MISUSE/ABUSE BY THE ELDERLY

Alcohol and Drug Abuse and the Elderly Task Force. Catherine McRae, Geriatric Services, Tennessee Task Force, State of Tennessee, Department of Mental Health and Mental Retardation, 501 Union Boulevard, Nashville, Tennessee 37219.

Alcoholism, Inebriety, Drug Information and Referral Services (A.I.D.) of Hennepin County. Peg Subby, Director, 1810 Chicago Avenue, Minneapolis, Minnesota 55404.

Broome County Drug Awareness Center Programs. Ronald Gaetano, Director, 22 Park Lane, Johnson City, New York 13790.

Bridgeway. Douglas Laurenzo, Social Service Coordinator, 22 27th Avenue, S.E., Minneapolis, Minnesota 55414.

Camellia House Licensed Chemical Dependency Program. Patricia Hansen, Program Director, Camellia House Convalescent and Nursing Home, 1620 Oak Park Avenue, N., Minneapolis, Minnesota 55411.

DISC-Drugs and the Elderly Program. College of Pharmacy, University of Minnesota, Minneapolis, Minnesota 55455.

Intervention Plus Program: Ebenezer Society. Ken McArthur, Coordinator, Ebenezer Society, 2523 Portland Avenue, Minneapolis, Minnesota 55404.

Management of Drug Abuse Among the Elderly: A Peer Counselor Approach. Priscilla R. Perry, Director of the Institute for the Study of Aging, University of Miami, Coral Gables, Florida, P.O. Box 248106 (through the Florida Drug Abuse Prevention and Education Trust, 105½ East College Avenue, Tallahassee, Florida 32301).

Northwestern Hospital Chemical Dependency Treatment Program. Reverend Phil Hansen, Program Coordinator, Northwestern Hospital, 27th and Chicago Avenue, Minneapolis, Minnesota 55407.

Older Life Drug Experience Research (OLDER). Maxie C. Maultsby, M.D., Albert B. Chandler Medical Center, College of Medicine, Center for Rational Behavior Therapy Training, Office of Continuing Education, University of Kentucky, Lexington, Kentucky 40506.

Queen Treatment Program for the Chemically Dependent Elderly. Muriel L. Ganje, Administrator, Queen Treatment Center, 300 Queen Avenue, N., Minneapolis, Minnesota 55405.

Ramsey County Senior Chemical Dependency Program. Cherie Jefferson, Program Coordinator, 544 West Central Avenue, Suite 1105, St. Paul, Minnesota 55103.

Seniors' Health Program: Augustana Hospital. Betsy Epstein, Health Education Seniors' Health Program, Augustana Hospital and Health Care Center, 411 West Dickens Avenue, Chicago, Illinois 60614.

THEE DOOR, Substance Abuse Intervention. Carol Ann Cheek, Associate Executive Director, 1710 West Colonial Drive, Orlando, Florida 32894.

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